ALLEN-BRADLEY

ControlView
Process Configuration and Operation

(Cat. No. 6190–PCO)

User Manual

Important User Information

Because of the variety of uses for this product and because of the differences between solid state products and electromechanical products, those responsible for applying and using this product must satisfy themselves as to the acceptability of each application and use of this product. For more information, refer to publication SGI-1.1 (Safety Guidelines For The Application, Installation and Maintenance of Solid State Control).

The illustrations, charts, and layout examples shown in this manual are intended solely to illustrate the text of this manual. Because of the many variables and requirements associated with any particular installation, Allen-Bradley Company cannot assume responsibility or liability for actual use based upon the illustrative uses and applications.

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Throughout this manual we make notes to alert you to possible injury to people or damage to equipment under specific circumstances.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention helps you:

- Identify a hazard
- Avoid the hazard
- recognize the consequences

Important: Identifies information that is critical for successful application and understanding of the product.

Using This Manual

Manual Objectives

Use this manual to familiarize yourself with:

- Process Configuration and Operation (referred to as PCO throughout this manual) software
- configuring a system using PCO software
- operating a system using PCO software

Intended Audience

We assume that you have:

- a strong working knowledge of your plant's process and equipment
- a basic understanding of process control
- a familiarity with personal computers, MS-DOS™ or PC-DOS™, ControlView™, and 6200-series programming software

You do not have to be a proficient computer operator to perform the tasks presented in this manual. Most of the process control tasks require only knowledge about the configuration of the process control system. Some of the operations you will read about, however, will require a familiarity with the organization and configuration of ControlView software.

Terms and Conventions

Computer Terms

Some of the tasks described in this manual assume that you have an acquaintance with basic computer terminology. Use the glossary at the end of this manual to define terms that are unfamiliar to you.

Process Control Terms

Use the information in chapter 1 to provide a better understanding of process control terms used in this manual.

Keyboard Terms

The keyboard is the primary means of communicating with ControlView and the PCO option. Terms that describe keyboard functions are found in the glossary.

Conventions

We use the following conventions in this manual to picture data entry and displays.

- Prompts and displays are shown like this:
  - `proportional gain`
- Literal text entry is shown like this:
  - **`Set Point`**
- Items for which you enter a word or value of your choice are shown like this:
  - *`filename`*
- Keystroke commands for the ControlView Operator Interface keyboard are enclosed in [ ] and shown like this:
  - **`[Enter]`**
- Keystroke commands for the PanelView Operator Interface terminal keyboard are enclosed in [ ] and shown like this:
  - **[SELECT]**
- Alternate keystroke commands are enclosed in [ ], separated by a hyphen, and shown like this:
  - **`[Alt-C]`**
- In places where we describe how to fill out worksheets, the entries are shown like this:
  - *TEMPERATURE*

Related Publications

Use these sources to learn more about process control and ControlView process control systems:

Table A
Related Publications

For more information about:	See publication:	Publication: number:
Designing a Process Control System	Process Control System Design Manual	ICCG 6.2.1
Using ControlView Batch Management	ControlView Batch Management User Manual	6190-6.5.8
Using the ControlView Core	ControlView Core User Manual	6190-6.5.1
Designing a PLC-5 System	PLC-5 Programmable Controllers Design Manual	1785-6.2.1
Using Analog Input Modules	IL & IFE Analog Input Module User Manual	1771-6.5.47
Using an RTD Module	IR RTD Input Module User Manual	1771-6.5.76
Using an Analog Output Module	OFE Analog Output Module User Manual	1771-6.5.30
Using a Thermocouple Module	IXE Thermocouple/Millivolt Module User Manual	1771-6.5.77
Using a Pulse Module	QRD Pulse Flow Meter Module User Manual	1771-6.5.73
Using a Hi-Res Thermocouple Module	IXHR High-Resolution Thermocouple/Millivolt Module User Manual	1771-6.5.80
Using N-series Analog Modules	High-Resolution Isolated Analog Modules User Manual	1771-6.5.64

How to Use This Manual

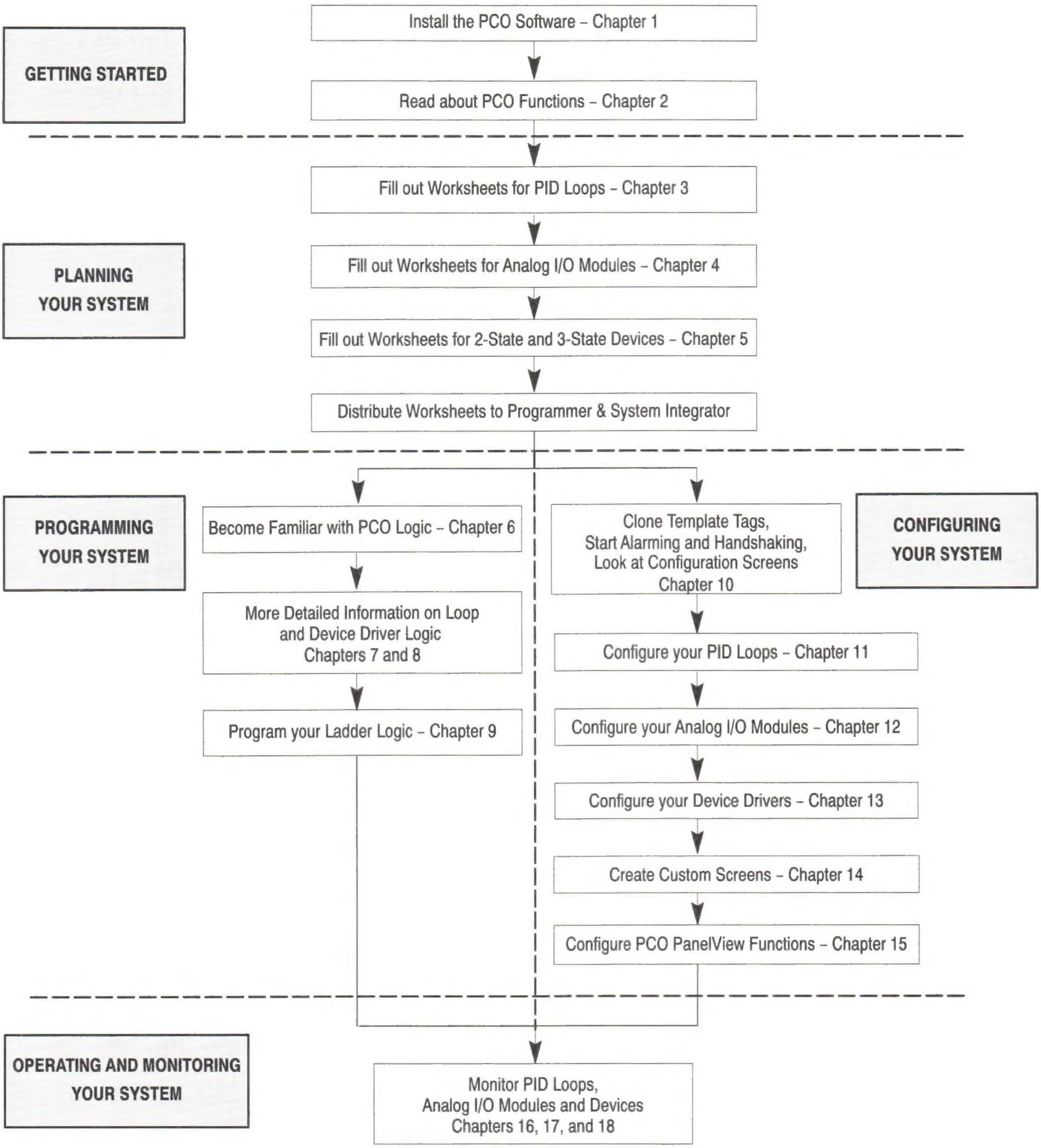
Follow these guidelines when using this manual:

- Read the chapters in order. If a chapter does not pertain to your application, you can skip it.
- Use the chapters to help you make design decisions.
- Use the worksheets at the back of the manual to record your decisions. If you use other documentation methods, check to make sure the decisions made on the worksheets are also included in your documentation.

Figure 1 can help you determine which chapters to read. Notice that you read certain chapters only if your application uses the component covered by that chapter.

Read the manual as indicated in Figure 1. Fill out all worksheets and prepare all documentation as requested. This will enable you to provide other members of the installation and start-up team with the information they need to properly do their jobs.

Figure 1
How to Read this Manual



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Section 1

Getting Started

Installing PCO Software – **Chapter 1**

Overview of PCO Functions and Tasks – **Chapter 2**

Use chapter 1 to help you install the PCO Software.

When you have finished the PCO software installation, read chapter 2 to learn what the PCO software can do and familiarize yourself with the terminology used in the remaining sections of this manual.

Chapter 1

Installing PCO Software

Chapter Objectives

Use the information in this chapter to install your PCO software.

Pre-Installation Considerations

PCO software is divided into three categories:

- ControlView files, which include configuration screens, faceplates, template tags, and the GRAFIX® library
- PLC® Ladder logic files
- PanelView screen files

There are two ways to install the ControlView portion of the PCO software. The method you choose depends on whether or not a compatible version of ControlView software already resides on your hard disk.

- If version 2.12 ControlView software already resides on your hard disk, then use the procedure "Installing the Software" in this chapter.
- If you have any other version of ControlView software, then install ControlView and all required options, including PCO, by following the instructions included in ControlView Installation Manual (publication 6190-6.5.25). After completing the ControlView portion of the installation, proceed to step 4. to continue the PCO installation.

Installing the Software

To install PCO software, do the following:

1. Insert the disk labeled "ControlView Files Disk 1 of *n*" into an appropriate disk drive and make this drive the default drive.

2. At the DOS prompt, type **`install`** *`driveletter`* **`[Enter]`**

   where *`driveletter`* is the letter of the drive on which ControlView software is installed. Typically the disks are inserted into drive A and the ControlView software is installed on drive C; consequently, the command is:

   ```
   A>install c [Enter]
   ```

3. Follow the instructions on the screen. When the installation process no longer needs the current disk, it prompts you to remove it and insert another one. Respond to these prompts by inserting the requested disk and pressing `[Enter]`. Continue this process until all PCO ControlView files disks have been installed.

   During the installation process, you will be prompted for a decision about installing the Process Graphics Library. The Process Graphics Library is a set of common process symbols that may be used in custom Mouse-GRAFIX screens. Respond by typing `[Y] [Enter]` or `[N] [Enter]` as desired.

4. Copy the ladder-code files appropriate for your processor to the specified PLC-5™ directory. See Table 1.A. Insert the "Ladder Code Files Disk *n*" into an appropriate disk drive, and make that drive the default drive.

Table 1.A
Ladder Code Files Disks

For this processor:	Use this disk:
PLC-5/30	Ladder Code Files Disk 1 of 3
PLC-5/40	Ladder Code Files Disk 2 of 3
PLC-5/60	Ladder Code Files Disk 3 of 3

5. Use the DOS COPY command to copy the ladder-code files to directory \ipds\arch\plc5. Typically the disk is inserted into drive A and the PLC-5 Programming Software software is installed on drive C; consequently, the command is:

```
A>copy *.* c:\ipds\arch\plc5 [Enter]
```

Important: If you are using a PLC-5/30 processor, before you can download the ladder logic to the processor, you must use 6200 offline programming to edit the program and remove the PCO functions you will not be using. (Refer to "Deleting Unnecessary Functions" in chapter 9.) The program as supplied contains all available PCO functions and is too large to be loaded into a PLC-5/30 processor.

6. Transfer the PCO ladder code from the hard disk to the PLC-5 processor by using the program restore feature of the PLC-5 Programming Software.

   If you need more information to complete this step, see the chapter "Saving and Restoring Processor Memory Files" in the "Files" section of the "PLC-5 Programming Software Programming" manual (publication 6200-6.4.7).

7. Use the DOS Copy command to copy the PanelView screen file to the \pds directory on the computer containing PanelBuilder software. If the diskette is in drive A: and PanelBuilder is on drive C:, the command is:

```
A>copy *.cfg c:\pds [Enter]
```

8. Transfer the PanelView screen files from the hard disk to the PanelView using the Download feature of PanelBuilder software.

Removing the Software

The following procedure describes how to remove PCO software from your hard disk. The procedure for removing the software is similar to installing it except that you only use "Disk 1."

To remove the ControlView portion of PCO software, do the following:

1. Insert the disk labeled "PCO ControlView Files Disk 1 of *n*" into an appropriate disk drive; and, if it is not already, make that drive the default drive.
2. At the DOS prompt, type **`uninstall`** *`driveletter`* **`[Enter]`** where *`driveletter`* is the letter of the hard disk. A message similar to this one appears on the screen:

```
OK to continue with the Uninstall (Y = continue, N =
abort)?
```

3. Type **`[Y] [Enter]`** to confirm you want PCO software removed; or, type **`[N] [Enter]`** to abort the uninstall process and return to DOS.

Important: Using "PCO ControlView Files Disk 1 of *n*" you can uninstall the graphics library; however, you cannot uninstall PanelView software and/or ladder-code files. To remove them, use the DOS Delete command to delete them from the directories where you installed them.

Chapter 2

Overview of PCO Functions and Tasks

Chapter Objectives

This chapter introduces you to PCO. Use the information in this chapter to learn about the capabilities PCO software provides and how to use it with other Allen-Bradley software.

About PCO

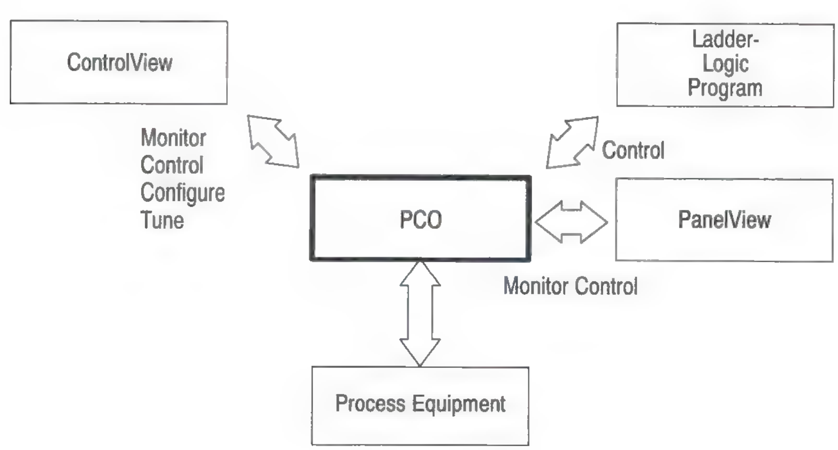
PCO, a ControlView option, is an Allen-Bradley software product that facilitates the use of Allen-Bradley products in process control applications (see Figure 2.1). PCO software provides a standard, consistent interface between:

- ControlView
- user-defined ladder logic programs
- PanelView operator terminal
- 6200-series programming software

when using:

- regulatory (PID) loops
- analog I/O
- two- and three-state devices

Figure 2.1
PCO Functional Overview



PCO software consists of the following features:

- ladder-code subroutines
- defined data blocks
- defined ControlView tags
- ControlView faceplates
- PanelView faceplates
- ControlView configuration screens

There are three classes of ladder logic subroutines, one for each type of function:

- PID loop
- analog I/O
- two- and three-state devices

Each subroutine provides a standard, versatile and configurable representation of its function.

PCO Requirements

Use PCO with the products in Table 2.A to create your process control system. Table 2.B lists the software requirements for performing specific PCO functions.

Table 2.A
Hardware and Software Compatibility

For this system component:	Use one of the following:
Processors	PLC-5/30 series A PLC-5/40 series B PLC-5/60 series B
Software	ControlView PanelBuilder
I/O Modules	1771-IFE Analog Input
	1771-IL Isolated Analog Input
	1771-IR RTD Input
	1771-IXE Thermocouple
	1771-IXHR High-Resolution Thermocouple
	1771-QRD Pulse
	1771-OFE Analog Output
	1771-NBRC High-Resolution Isolated Analog (RTD Input; 4-20mA Output)
	1771-NBTC High-Resolution Isolated Analog (TC/mV Input; 4-20mA Output)
	1771-NBVC High-Resolution Isolated Analog (±5V Input; 4-20mA Output)
	1771-NIV High-Resolution Isolated Analog (±5V Input)
	1771-NIVR High-Resolution Isolated Analog (±5V Input; RTD Input)
	1771-NIVT High-Resolution Isolated Analog (±5V Input; TC/mV Input)

Table 2.A
Hardware and Software Compatibility Continued

For this system component:	Use one of the following:
I/O Modules (Continued)	1771-NOC High-Resolution Isolated Analog (4-20mA Output)
	1771-NOV High-Resolution Isolated Analog (±10V Output)
	1771-NR High-Resolution Isolated Analog (RTD Input)
	1771-NT1 High-Resolution Isolated Analog (TC/mV Input)

Table 2.B
Software Requirements

In order to use:	You will need:	Cat No:
PCO	PCO Software PLC-5 Programming Software ControlView Core Software ControlView Alarming Software ControlView A-B Drivers	6190-PCO 6200-PLC5 6190-CVC 6190-ALM 6190-ABD
PCO PID Tuning	ControlView Trending Software	Add 6190-TND
PCO PanelView Functions	PanelBuilder Software	Add 2711-ND1
PCO Graphics Library, PCO Faceplates	ControlView Mouse-GRAFIX	Add 6190-MGX

Function Descriptions

As mentioned on page 2-1, PCO software has the following functions:

- PID loops
- analog devices
- two-state and three-state device drivers

You use these functions to interface your system hardware to ControlView. You accomplish this by calling ladder-logic subroutines, which are provided with PCO, from your ladder-logic program.

In addition, PCO provides:

- digital override logic
- custom alarm logic
- PLC status alarms

You may find this information useful when you are filling out the worksheets in the next section.

PID Function

The PID function provides a consistent interface to a user's PID loops. The basic function provided by a PID loop is to control an output variable (the controlled variable) to minimize the error between an input variable (the process variable) and a target value (the setpoint). The PID function does this by repeatedly measuring the error value and adjusting the control value to reduce the error. The PCO PID function includes many options and additions to maximize its flexibility and provide the power needed to handle complex process applications.

The PID function supports the following features:

- Selection of master, slave, master/slave, or standard loops.

  When the output of one loop feeds the setpoint of a second loop, the first is a master the second is a slave. If the output of the second loop feeds the setpoint of a third, the second loop becomes both master (to the third loop) and slave (to the first loop).

- Multiple control modes including supervisory, non-supervisory, cascade/ratio, auto, manual, override, and hand modes.

- Operational status including selection of ratio, cascade, auto, manual, override and hand modes, the setpoint value, the manual output value, and the ratio multiplier value, if applicable.

  These can be controlled either from the PLC processor or via ControlView or PanelView. When the loop is in supervisory state, these items are controlled from the PLC processor. When in non-supervisory state, these items are controlled via ControlView or PanelView.

  - **Ratio:** Only a master or standard loop can be in ratio mode. In the ratio mode, the setpoint is equal to the ratio input values times the ratio multiplier.

  - **Cascade:** Only a slave or master/slave loop can be in cascade mode. In cascade mode, the slave loop setpoint is equal to the master loop output. Note that the master loop output will automatically be scaled from 0-100% of the process variable scaling range of the slave loop.

  - **Manual:** In manual mode, the loop output is set to the configured override value.

  - **Override:** In override mode, the loop output is set to the configured override value.

  - **Hand:** In hand mode, the loop output will be set to the tieback value.

- Selection of the dependent or independent gains version of the PID equation.
- Selection of direct or reverse acting control.
- Optional inclusion of setpoint changes in calculation of the derivative term.
- Optional process variable tracking mode.

  When process variable tracking is enabled, loop logic forces the setpoint to track the process variable when the loop is in manual mode.
- Optional master tracking mode.

  Master tracking controls the behavior of a master loop when the corresponding slave loop enters or leaves cascade/ratio mode. If the slave loop of a cascaded pair of loops is switched from cascade mode to manual or auto, the master loop will often run away, because changes in its output no longer affect the process variable. In this situation, the master loop can be configured to switch to manual and begin tracking the slave loop's setpoint. When the slave is switched back to cascade mode, the master loop can be configured to return to auto.
- Optional zero crossing deadband.

  This function suspends control action once the error reaches zero or changes sign, as long as the error magnitude remains within the deadband setting.
- Automatic setpoint ramp functions are available to both the operator and the user's ladder logic. This function allows a setpoint to be ramped from its current value to a specified target value, over a specified time period.
- Optional output limiting.
- Integration with the provided ControlView tuning screen for trend display of process variable, setpoint, and control variable, and gain adjustment.
- Integration with the provided PanelView faceplate for monitoring and controlling loop functions from a PanelView terminal.
- Alarms to indicate invalid configurations and process variable and deviation alarms (four levels each).
- Alarm suppression and ControlView handshake logic for important run-time alarms.

- The data sources for the process variable, tieback, ratio input, and output signals may be defined as the output of an analog I/O function or as any data table value.
- Both Selectable Timed Interrupt (STI) and non-STI implementations are allowed.
- No implied decimal points are needed for any data values. All appropriate values are manipulated as floating point values.

Analog I/O Functions

The analog I/O functions help provide an easily configured interface with common Allen-Bradley analog I/O modules. All the analog I/O function support the following features:

- All block transfers are configured by the function; no block transfer programming is needed.
- For input modules, the function reads the input data, converts it to floating point, and scales it into engineering units.
- For output modules, the function accepts a floating point output value in engineering units, converts it to the module data format, and sends it to the module.
- Integration with the provided ControlView template database and faceplate graphic for full display of all values, modes, states, and alarms and for full operator interface capabilities.
- Modules may be placed anywhere in the PLC-5 I/O racks.
- Both Real Time Sampling and Selectable Timed Interrupt implementations are allowed.
- Input override logic is provided for all input channels.
- The data sources for the output channels may be defined as the output of a PID function or as any data table value.
- Block transfer reads from output modules may be performed either continuously or on demand.
- Alarms are provided to indicate invalid configurations and module communications time-outs.
- Alarm suppression and ControlView handshake logic is included for important run-time alarms.

In addition to the general features described above, the following module-specific functions are supported:

- IFE: Selection of filter time constant, single ended or differential inputs, and input range.
- IL: Selection of filter time constant and input range.
- IR: Selection of engineering units, RTD type, ohms resolution, and copper RTD resistance.
- IXE: Selection of input range, temperature scale, and high/low alarm values.
- IXHR: Selection of input range, temperature scale, filter time constant, and high/low alarm values. Also supports optional zoom mode.
- QRD: The function manages the four totalizer counters and provides a floating point total for each, as well as a means to reset the values.
- N-Series: For input channels, selection of input filter time constant, high, low, underrange, overrange, and rate alarm values and, if applicable, thermocouple type, RTD type, and RTD offset. For output channels, selection of output clamping, ramp rate limiting, reset state, high and low clamp, and rate alarm values.

Device Driver Functions

The device driver functions provide a consistent interface to your two-state and three-state process devices. Two-state devices are either on or off and include pumps, motors and solenoid valves. Three-state devices have forward, reverse, and off states and include three-way valves, two speed motors, etc. The two-state device driver function has one output representing the commanded state of the device and up to two feedback inputs from the device indicating the actual state of the device. The three-state device driver function has two outputs representing the commanded state of the device and up to four feedback inputs from the device indicating the actual state of the device.

When the commanded state of the device is changed, the device driver monitors the feedback inputs to verify that the device actually changes state within a user specified time period. If this does not occur, an alarm is activated. An alarm is also activated if the device state indicated by the feedbacks changes without the commanded state changing.

Both device drivers support the following features:

- multiple control modes including supervisory, manual, and override modes.
- integration with the provided ControlView template database and faceplate graphic for full display of all modes, states, and alarms and for full operator interface capabilities.
- alarms to indicate invalid configurations, device faults, and mode faults,
- alarm suppression and ControlView handshake logic is included for important run-time alarms.

Digital Override Logic

PCO logic for digital inputs allows you to override the value of any possible digital input. The override logic uses the input signal, the override enable signal, and the override value to determine the resultant input value and makes this value available in the data table as an input state.

Custom Alarm Logic

The PCO logic for custom alarms allows the ladder logic you generate to trigger ControlView alarms based on events that you decide are critical. Your ladder logic can also suppress any custom alarm. Logic is provided for 256 custom alarms.

PLC Status Alarms

The PCO logic for PLC status alarms can display a ControlView alarm upon a battery-low condition or a rack fault condition.

Section 2

Planning Your System

Planning PID Loop Functions – **Chapter 3**

Planning Analog I/O Functions – **Chapter 4**

Planning Device Driver Functions – **Chapter 5**

The next three chapters help you plan your specific PCO functions. While reading these chapters, you will fill out worksheets provided in appendix B.

After completing the worksheets from this section, forward copies of them to your ladder-logic programmers and software integrators. Programmers will need the information to write the user-generated, ladder-logic programs that control the equipment in your system. Integrators need the information for the PCO configuration screens.

Also, forward copies of the worksheets to your hardware installers. They need the information to install and connect the equipment.

Finally, keep a copy of the completed worksheets as part of the system documentation package. The information contained on the worksheets can be used as part of the system validation process required within certain industries by government agencies and industry associations.

Chapter 3

Planning PID Loop Functions

Chapter Objectives

Read this chapter to learn how to plan PID loop functions by using the worksheets we provide in appendix B.

Prerequisites

To complete the PID loop worksheets, you need:

- a schematic drawing of your process control system
- a bill of materials giving detailed information about the devices, loops, and miscellaneous hardware elements in the system that you will connect to I/O modules
- an understanding of the PLC-5 processor I/O addressing scheme
- copies of worksheet 3.1 made from the one in appendix B
- If you will be using the PCO PanelView function, reserve I/O racks 6 and 7 for use by the PanelView terminal.

⚠ **ATTENTION:** If you will be using PCO PanelView functions, read the important notice on page 15-2.

Completing Worksheets for PID Loops

To plan your requirements for PID loops, use worksheet 3.1, PID Loop Assignments. See appendix B for the worksheet. Figure 3.1 shows a sample page of a completed PID loop assignment worksheet. Table 3.A explains each line on the worksheet. To use worksheet 3.1, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.
2. Use as many worksheets as necessary to document all PID loops in the system.
3. Fill in the information requested for each PID loop.

Figure 3.1
Sample of Completed PID Loop Worksheet

PCO Worksheet 3.1
PID Loop Assignments

Date 8/6/92
Page 1 of 2

Loop Name	FIC1213	REACT_TMP		
Integer Data Block Address	N202:0	N202:80		
Floating Point Data Block Address	F203:0	F203:80		
Description	STEAM FLOW CONTROLLER	REACTOR TEMPERA-TURE		
PID Loop Enabled (1=Yes/0=No)	1	1		
STI/Non-STI (1=STI/0=Non-STI)	1	1		
Alternate Update Time (seconds)	0	0		
Equation (1=Dependent/0=Independent)	0	0		
Control Action (1=Reverse/0=Direct)	0	0		
Derivative of (1=Error/0=PV)	0	0		
Proportional Gain	1.5	2.38		
Integral Gain	0.1	0.075		
Derivative Gain	0	0.13		
Feedforward or Bias	0	0		
Deadband	0	0		
PV Tracking (1=Yes/0=No)	0	0		
Cascade/Ratio Mode Allowed (1=Yes/0=No)	1	0		
Master Loop (1=Yes/0=No)	0	1		
Slave Loop Data Block File Number (125-998)	125	202		
Slave Loop Data Block Element Number (0-920)	0	0		
Master Track When Slave Leaves Cascade (1=Yes/0=No)	0	1		
Master Track When Slave Enters Cascade (1=Yes/0=No)	0	1		
Slave Loop (1=Yes/0=No)	1	0		
Master Loop Data Block File Number (125-998)	202	125		
Master Loop Data Block Element Number (0-920)	80	0		
PV Data Source Selector (1=Analog/0=Alternate)	1	1		
PV Module Data Block File Number (125-998)	204	210		
PV Module Data Block Element Number (0-999)	0	0		
PV Channel Number (0-15)	0	7		
PV Minimum Input	0	0		
PV Maximum Input	200	300		
TB Data Source Selector (1=Analog/0=Alternate)	0	0		
TB Module Data Block File Number (125-998)	125	125		
TB Module Data Block Element Number (0-999)	0	0		
TB Channel Number (0-15)	0	0		
TB Minimum Input	0	0		
TB Maximum Input	0	0		
Ratio Input Data Source Selector (1=Analog/0=Alternate)	0	0		
Ratio Input Module Data Block File Number (125-998)	125	125		
Ratio Input Module Data Block Element Number (0-999)	0	0		

PCO Worksheet 3.1
PID Loop Assignments Continued

Date 8/6/92
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Ratio Input Channel Number (0-15)	0	0		
Ratio Input Minimum Input	0	0		
Ratio Input Maximum Input	0	0		
CV Data Destination Selector (1=Analog/0=Alternate)	1	0		
CV Module Data Block File Number (125-998)	216	125		
CV Module Data Block Element Number (0-999)	0	0		
CV Channel Number (0-15)	0	0		
CV Minimum Output Limit	0	0		
CV Maximum Output Limit	100	100		
Override Value	0	0		
PV Alarm Deadband	0	4		
Low-Low PV Alarm Limit	-1000	-1000		
Low PV Alarm Limit	-1000	-1000		
High PV Alarm Limit	1000	250		
High-High PV Alarm Limit	1000	275		
Deviation Alarm Deadband	0	4		
Low-Low Deviation Alarm Limit	-1000	-30		
Low Deviation Alarm Limit	-1000	-20		
High Deviation Alarm Limit	1000	20		
High-High Deviation Alarm Limit	1000	30		

Table 3.A
Field Descriptions for PID Loop Worksheet

Important: When a field says "irrelevant if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Loop Name	Assign a unique name to every PID loop. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Floating Point Data Block Address	Assign an address for the floating point data block. The floating point data block file number must be 1 greater than the integer data block file number. The floating point element must be the same as the integer element.	
Description	Describe the function of every PID loop. The description can contain a maximum of 32 characters (letters and/or numbers).	
PID Loop Enabled	Enable or disable the PID loop. To enable the loop, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
STI/Non-STI	If the loop is in a selectable timed interrupt routine, enter a 1; otherwise, enter a 0.	Binary 0 or 1
Alternate Update Time	Specify a loop update time (in seconds) that is used if the loop is a non-STI PID loop and if the PV value is not obtained from an analog I/O function, i.e., PV Data Source Selector = 0.	Float >0

Table 3.A
Field Descriptions for PID Loop Worksheet Continued

For this field:	Do this:	Value:
Equation	If the equation is a dependent type, enter a 1; if it is an independent type, enter a 0.	Binary 0 or 1
Control Action	If error calculation should use the reverse method (E = PV - SP), enter a 1; if the direct method (E = SP - PV), enter a 0.	Binary 0 or 1
Derivative of	If the derivative term should be calculated from the error (ΔE), enter a 1; if from the process variable (ΔPV), enter a 0.	Binary 0 or 1
Proportional Gain	Specify either the proportional-gain constant (independent equation only) or the controller-gain constant (dependent equation only).	Float ≥ 0
Integral Gain	Specify either the integral gain per second (independent equation only) or the integral time-constant in minutes-per-repeat (dependent equation only).	Float ≥ 0
Derivative Gain	Specify either the derivative gain in seconds (independent equation only) or the derivative time-constant in minutes (dependent equation only).	Float ≥ 0
Feedforward or Bias	Specify the feedforward or loop bias value.	Float ≥ 0
Deadband	Specify the zero-crossing deadband value.	Float ≥ 0
PV Tracking	If the setpoint should track the process variable when the loop is in manual mode, enter a 1; otherwise, enter a 0.	Binary 0 or 1
Cascade/Ratio Mode Allowed	To allow the loop to enter the cascade or ratio mode, enter a 1; otherwise, enter a 0.	Binary 0 or 1
Master Loop	If the loop is a master in a cascaded control scheme, enter a 1; otherwise, enter a 0.	Binary 0 or 1
Slave Loop Data Block File Number	Specify the file number of the slave loop. Irrelevant if Master Loop = 0.	Integer 125 - 998
Slave Loop Data Block Element Number	Specify the element number of the slave loop. Irrelevant if Master Loop = 0.	Integer 0 - 920
Master Track When Slave Leaves Cascade	If the master loop should go to manual mode and have its output track the setpoint of the slave loop when the slave loop is not in cascade/ratio mode, enter a 1; otherwise, enter a 0. Irrelevant if Master Loop = 0.	Binary 0 or 1
Master Track When Slave Enters Cascade	If the master loop should go to automatic mode when the slave loop enters either cascade/ratio mode, enter a 1; otherwise, enter a 0. Irrelevant if Master Loop = 0.	Binary 0 or 1
Slave Loop	If the loop is a slave in a cascaded control scheme, enter a 1; otherwise, enter a 0.	Binary 0 or 1
Master Loop Data Block File Number	Specify the file number of the master loop. Irrelevant if Slave Loop = 0.	Integer 125 - 998
Master Loop Data Block Element Number	Specify the element number of the master loop. Irrelevant if Slave Loop = 0.	Integer 0 - 920
PV Data Source Selector	If the source of process-variable data is an analog function, enter a 1; if it is an alternate location, enter a 0.	Binary 0 or 1
PV Module Data Block File Number	Specify the integer file number of the analog function that is the source of the PV data. Irrelevant if PV Data Source Selector = 0.	Integer 125 - 998
PV Module Data Block Element Number	Specify the starting element number of the data block for the analog function that is the source of the PV data. Irrelevant if PV Data Source Selector = 0.	Integer 0 - 999
PV Channel Number	Specify the channel number of the analog input module that is the source of the PV data. Irrelevant if PV Data Source Selector = 0.	Integer 0 - 15
PV Minimum Input	Specify the minimum value (in engineering units) of the process-variable.	Float
PV Maximum Input	Specify the maximum value (in engineering units) of the process-variable.	Float

Table 3.A
Field Descriptions for PID Loop Worksheet Continued

For this field:	Do this:	Value:
TB Data Source Selector	If the source of tieback data is an analog function, enter a 1; if it is an alternate location, enter a 0.	Binary 0 or 1
TB Module Data Block File Number	Specify the integer file number of the analog function that is the source of the TB data. Irrelevant if TB Data Source Selector = 0.	Integer 125 - 998
TB Module Data Block Element Number	Specify the starting element number of the data block for the analog function that is the source of the TB data. Irrelevant if TB Data Source Selector = 0.	Integer 0 - 999
TB Channel Number	Specify the channel number of the analog input module that is the source of the TB data. Irrelevant if TB Data Source Selector = 0.	Integer 0 - 15
TB Minimum Input	Specify the minimum value (in engineering units) of the tieback input.	Float
TB Maximum Input	Specify the maximum value (in engineering units) of the tieback input.	Float
Ratio Data Source Selector	If the source of ratio data is an analog function, enter a 1; if it is an alternate location, enter a 0.	Binary 0 or 1
Ratio Input Module Data Block File Number	Specify the integer file number of the analog function that is the source of the ratio data. Irrelevant if Ratio Input Data Source Selector = 0.	Integer 125 - 998
Ratio Input Module Data Block Element Number	Specify the starting element number of the data block for the analog function that is the source of the ratio data. Irrelevant if Ratio Input Data Source Selector = 0.	Integer 0 - 999
Ratio Channel Number	Specify the channel number of the analog input module that is the source of the ratio data. Irrelevant if Ratio Input Data Source Selector = 0.	Integer 0 - 15
Ratio Minimum Input	Specify the minimum value (in engineering units) of the ratio input.	Float
Ratio Maximum Input	Specify the maximum value (in engineering units) of the ratio input.	Float
CV Data Destination Selector	If the destination of the control variable is an analog function, enter a 1; if it is an alternate location, enter a 0.	Binary 0 or 1
CV Module Data Block File Number	Specify the integer file number of the analog function that is the source of the CV data. Irrelevant if CV Data Destination Selector = 0.	Integer 125 - 998
CV Module Data Block Element Number	Specify the starting element number of the data block for the analog function that is the source of the CV data. Irrelevant if CV Data Destination Selector = 0.	Integer 0 - 999
CV Channel Number	Specify the channel number of the analog input module that is the source of the CV data. Irrelevant if CV Data Destination Selector = 0.	Integer 0 - 7
CV Minimum Output Limit	Specify a minimum value (in engineering units) for the control-variable output.	Float
CV Maximum Output Limit	Specify a maximum value (in engineering units) for the control-variable output.	Float
Override Value	Specify a value (in engineering units) for the control-variable output when the loop is in override mode.	Float
PV Alarm Deadband	Specify a value (in engineering units) for the process-variable alarm deadband. To disable the deadband, set the value to 0.	Float ≥ 0
Low-Low PV Alarm Limit	Specify a value (in engineering units) for the low-low process-variable alarm limit. To disable this alarm, set a value less than the PV Minimum Input.	Float
Low PV Alarm Limit	Specify a value (in engineering units) for the low process-variable alarm limit. To disable this alarm, set a value less than the PV Minimum Input.	Float
High PV Alarm Limit	Specify a value (in engineering units) for the high process-variable alarm limit. To disable this alarm, set a value greater than the PV Maximum Input.	Float
High-High PV Alarm Limit	Specify a value (in engineering units) for the high-high process-variable alarm limit. To disable this alarm, set a value greater than the PV Maximum Input.	Float

Table 3.A
Field Descriptions for PID Loop Worksheet Continued

For this field:	Do this:	Value:
Deviation Alarm Deadband	Specify a value (in engineering units) for the deviation alarm deadband. To disable the deadband, set the value to 0.	Float ≥0
Low-Low Deviation Alarm Limit	Specify a value (in engineering units) for the low-low deviation alarm limit. This value should be a negative number since the deviation alarm works on error. To disable this alarm, set a value less than the negative of the process-variable span (in engineering units).	Float
Low Deviation Alarm Limit	Specify a value (in engineering units) for the low deviation alarm limit. This value should be a negative number since the deviation alarm works on error. To disable this alarm, set a value less than the negative of the process-variable span (in engineering units).	Float
High Deviation Alarm Limit	Specify a value (in engineering units) for the high deviation alarm limit. This value should be a positive number since the deviation alarm works on error. To disable this alarm, set a value greater than the PV span (in engineering units).	Float
High-High Deviation Alarm Limit	Specify a value (in engineering units) for the high-high deviation alarm limit. This value should be a positive number since the deviation alarm works on error. To disable this alarm, set a value greater than the PV span (in engineering units).	Float

What To Do Next

After completing the Worksheets for your PID loop functions:

If you:	Then go to:
need to plan your analog I/O modules	chapter 4, Planning Analog I/O Functions
need to plan your device drivers	chapter 5, Planning Device Driver Functions
are finished planning your functions and want to program your ladder logic	section 3, Programming
are finished planning your functions and want to configure your system functions	section 4, Configuring Your System

Chapter 4

Planning Analog I/O Functions

Chapter Objectives

Read this chapter to learn how to assign Analog I/O functions by using the worksheets we provide in appendix B. The following modules are covered in this chapter:

- IFE modules
- IL modules
- IR modules
- IXE modules
- IXHR modules
- QRD modules
- OFE modules
- N-Series modules

Prerequisites

To complete the analog I/O worksheets, you need:

- a schematic drawing of your process control system
- a bill of materials giving detailed information about the devices, loops, and miscellaneous hardware elements in the system that you will connect to I/O modules
- an understanding of the PLC-5 processor I/O addressing scheme
- a supply of blank worksheets made from those in appendix B
- If you will be using the PCO PanelView function, reserve I/O racks 6 and 7 for use by the PanelView terminal.

ATTENTION: If you will be using PCO PanelView functions, read the important notice on page 15-2.

Completing Worksheets for IFE Modules

To plan your requirements for 1771-IFE analog input modules, use worksheet 4.1, 1771-IFE Assignments. See appendix B for blank copies. Figure 4.1 shows a sample page of a completed worksheet. Table 4.A explains each line on the worksheet. To use worksheet 4.1, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.

2. Use as many worksheets as necessary to document all of the 1771-IFE modules in the system.

3. Fill in the information requested for each 1771-IFE module.

Figure 4.1
Sample of Completed 1771-IFE Worksheet

PCO Worksheet 4.1
1771-IFE Assignments

Date 8/6/92
Page 1 of 3

Module Name	FLOWS_060			
Integer Data Block Address	N204:0			
Floating Point Data Block Address	F205:0			
Timer and Block Transfer Element Number	0			
Description	FLOW INPUTS, RACK=0, GROUP=6, SLOT=0			
Input Type (1=Differential/0=Single-Ended)	1			
Module Enabled (1=Yes/0=No)	1			
STI/Non-STI (1=STI/0=Non-STI)	1			
Rack Number[1]	0			
Group Number (0-7)	6			
Slot Number (0-1)	0			
Real-Time Sample Rate (0-3.1 seconds)	0			
Filter Time-Constant (0-99)	0			
Input-0 Range (0-3)[2]	0			
Input-0 Minimum Scaling Value	0			
Input-0 Maximum Scaling Value	200			
Input-0 Override Enable (1=Yes/0=No)	0			
Input-0 Override Value	0			
Input-1 Range (0-3)[2]	0			
Input-1 Minimum Scaling Value	0			
Input-1 Maximum Scaling Value	100			
Input-1 Override Enable (1=Yes/0=No)	0			
Input-1 Override Value	0			
Input-2 Range (0-3)[2]	0			
Input-2 Minimum Scaling Value	0			
Input-2 Maximum Scaling Value	350.4			
Input-2 Override Enable (1=Yes/0=No)	0			
Input-2 Override Value	0			
Input-3 Range (0-3)[2]	0			
Input-3 Minimum Scaling Value	0			
Input-3 Maximum Scaling Value	0			
Input-3 Override Enable (1=Yes/0=No)	0			
Input-3 Override Value	0			
Input-4 Range (0-3)[2]	0			
Input-4 Minimum Scaling Value	0			
Input-4 Maximum Scaling Value	0			
Input-4 Override Enable (1=Yes/0=No)	0			
Input-4 Override Value	0			
Input-5 Range (0-3)[2]	0			
Input-5 Minimum Scaling Value	0			

PCO Worksheet 4.1
1771-IFE Assignments Continued

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Input-5 Maximum Scaling Value	0			
Input-5 Override Enable (1=Yes/0=No)	0			
Input-5 Override Value	0			
Input-6 Range (0-3)[2]	0			
Input-6 Minimum Scaling Value	0			
Input-6 Maximum Scaling Value	0			
Input-6 Override Enable (1=Yes/0=No)	0			
Input-6 Override Value	0			
Input-7 Range (0-3)[2]	0			
Input-7 Minimum Scaling Value	0			
Input-7 Maximum Scaling Value	0			
Input-7 Override Enable (1=Yes/0=No)	0			
Input-7 Override Value	0			
Input-8 Range (0-3)[2]	0			
Input-8 Minimum Scaling Value	0			
Input-8 Maximum Scaling Value	0			
Input-8 Override Enable (1=Yes/0=No)	0			
Input-8 Override Value	0			
Input-9 Range (0-3)[2]	0			
Input-9 Minimum Scaling Value	0			
Input-9 Maximum Scaling Value	0			
Input-9 Override Enable (1=Yes/0=No)	0			
Input-9 Override Value	0			
Input-10 Range (0-3)[2]	0			
Input-10 Minimum Scaling Value	0			
Input-10 Maximum Scaling Value	0			
Input-10 Override Enable (1=Yes/0=No)	0			
Input-10 Override Value	0			
Input-11 Range (0-3)[2]	0			
Input-11 Minimum Scaling Value	0			
Input-11 Maximum Scaling Value	0			
Input-11 Override Enable (1=Yes/0=No)	0			
Input-11 Override Value	0			
Input-12 Range (0-3)[2]	0			
Input-12 Minimum Scaling Value	0			
Input-12 Maximum Scaling Value	0			
Input-12 Override Enable (1=Yes/0=No)	0			
Input-12 Override Value	0			
Input-13 Range (0-3)[2]	0			
Input-13 Minimum Scaling Value	0			
Input-13 Maximum Scaling Value	0			
Input-13 Override Enable (1=Yes/0=No)	0			
Input-13 Override Value	0			
Input-14 Range (0-3)[2]	0			

PCO Worksheet 4.1
1771-IFE Assignments Continued

Date *8/6/92*
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Input-14 Minimum Scaling Value	*0*			
Input-14 Maximum Scaling Value	*0*			
Input-14 Override Enable (1=Yes/0=No)	*0*			
Input-14 Override Value	*0*			
Input-15 Range (0-3)[2]	*0*			
Input-15 Minimum Scaling Value	*0*			
Input-15 Maximum Scaling Value	*0*			
Input-15 Override Enable (1=Yes/0=No)	*0*			
Input-15 Override Value	*0*			

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.
[2] Input ranges: 0 = 1 to 5V, 4 to 20 mA; 1 = 0 to 5V, 0 to 20 mA; 2 = –5 to +5V, –20 to +20 mA; 3 = –10 to +10V

Table 4.A
Field Descriptions for 1771-IFE Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Module Name	Assign a unique name to every 1771-IFE module. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Floating Point Data Block Address	Assign an address for the floating point data block. The floating point data block file number must be 1 greater than the integer data block file number. The floating point element must be the same as the integer element.	
Timer and Block Transfer Element Number	Assign a unique element number to each 1771-IFE module. The device driver requires one PLC timer element (in file T43) and two block transfer elements (in files BT44 and BT45). The element number must be identical in all three files.	Integer 0 - 999
Description	Describe the function of every 1771-IFE module. The description can contain a maximum of 32 characters (letters and/or numbers).	
Input Type	If the input type is differential, enter a 1; if it is single-ended, enter a 0.	Binary 0 or 1
Module Enabled	Enable or disable each 1771-IFE module. To enable the module, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
STI/Non-STI	If this analog function will be in a selectable timed interrupt routine, enter a 1; if in a non-selectable timed interrupt routine, enter a 0.	Binary 0 or 1
Rack Number	Assign a rack number to every 1771-IFE module.	Integer 0 - 27[1] (octal)
Group Number	Assign a group number to every 1771-IFE module.	Integer 0 - 7
Slot Number	Assign a slot number to every 1771-IFE module.	Integer 0 - 1

Table 4.A
Field Descriptions for 1771-IFE Worksheet Continued

For this field:	Do this:	Value:
Real-Time Sample Rate	Assign a real-time sample rate to each 1771-IFE module. The rate applies to all inputs within the module.	Integer 0 - 3.1 (seconds)
Filter Time-Constant	Assign a filter time-constant to each 1771-IFE module. The time-constant applies to all inputs within the module. Time-constant (in seconds) = (value / 100). For example, 99 corresponds to 0.99 seconds.	Integer 0 - 99
Input-*n* Range	Individually assign a range to each input ($0 \leq n \leq 15$) from the chart below. Range Description 0 1 to 5 V or 4 to 20 mA 1 0 to 5 V or 0 to 20 mA 2 −5 to +5 V or −20 to +20 mA 3 −10 to +10 V	Integer 0 - 3
Input-*n* Minimum Scaling Value	Individually assign a minimum scaling value (in engineering units) to each input ($0 \leq n \leq 15$). This value corresponds to the minimum raw input of the module (4 mA for example).	Float
Input-*n* Maximum Scaling Value	Individually assign a maximum scaling value (in engineering units) to each input ($0 \leq n \leq 15$). This value corresponds to the maximum raw input of the module (20 mA for example).	Float
Input-*n* Override Enable	Individually enable or disable override for each input ($0 \leq n \leq 15$). To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*n* Override Value	Individually assign an override value (in engineering units) to each input ($0 \leq n \leq 15$).	Float

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Completing Worksheets for IL Modules

To plan your requirements for 1771-IL isolated analog input modules, use worksheet 4.2, 1771-IL Assignments. See appendix B for blank copies. Figure 4.2 shows a sample page of a completed worksheet. Table 4.B explains each line on the worksheet. To use worksheet 4.2, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.

2. Use as many worksheets as necessary to document all of the 1771-IL modules in the system.

3. Fill in the information requested for each 1771-IL module.

Figure 4.2
Sample of Completed 1771-IL Worksheet

PCO Worksheet 4.2
1771-IL Assignments

Date *8/6/92*
Page *1 of 2*

Module Name	*IL231*			
Integer Data Block Address	*N206:50*			
Floating Point Data Block Address	*F207:50*			
Timer and Block Transfer Element Number	*3*			
Description	*IL IN RACK 2, GROUP 3, SLOT 1*			
Module Enabled (1=Yes/0=No)	*1*			
STI/Non-STI (1=STI/0=Non-STI)	*0*			
Rack Number[1]	*2*			
Group Number (0-7)	*3*			
Slot Number (0-1)	*1*			
Real-Time Sample Rate (0-3.1 seconds)	*.8*			
Filter Time-Constant (0-99)	*0*			
Input-0 Range (0-3)[2]	*0*			
Input-0 Minimum Scaling Value	*0*			
Input-0 Maximum Scaling Value	*100*			
Input-0 Override Enable (1=Yes/0=No)	*0*			
Input-0 Override Value	*0*			
Input-1 Range (0-3)[2]	*2*			
Input-1 Minimum Scaling Value	*-100*			
Input-1 Maximum Scaling Value	*100*			
Input-1 Override Enable (1=Yes/0=No)	*0*			
Input-1 Override Value	*0*			
Input-2 Range (0-3)[2]	*0*			
Input-2 Minimum Scaling Value	*-800*			
Input-2 Maximum Scaling Value	*200*			
Input-2 Override Enable (1=Yes/0=No)	*0*			
Input-2 Override Value	*0*			
Input-3 Range (0-3)[2]	*0*			
Input-3 Minimum Scaling Value	*0.000*			
Input-3 Maximum Scaling Value	*1.000*			
Input-3 Override Enable (1=Yes/0=No)	*0*			
Input-3 Override Value	*0*			
Input-4 Range (0-3)[2]	*0*			
Input-4 Minimum Scaling Value	*0*			
Input-4 Maximum Scaling Value	*10,000*			
Input-4 Override Enable (1=Yes/0=No)	*0*			
Input-4 Override Value	*0*			
Input-5 Range (0-3)[2]	*0*			
Input-5 Minimum Scaling Value	*0*			
Input-5 Maximum Scaling Value	*55.6*			

PCO Worksheet 4.2
1771-IL Assignments Continued

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Input-5 Override Enable (1=Yes/0=No)	0			
Input-5 Override Value	0			
Input-6 Range (0-3)[2]	0			
Input-6 Minimum Scaling Value	0			
Input-6 Maximum Scaling Value	0			
Input-6 Override Enable (1=Yes/0=No)	0			
Input-6 Override Value	0			
Input-7 Range (0-3)[2]	0			
Input-7 Minimum Scaling Value	0			
Input-7 Maximum Scaling Value	0			
Input-7 Override Enable (1=Yes/0=No)	0			
Input-7 Override Value	0			

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.
[2] Input ranges: 0 = 1 to 5V, 4 to 20 mA; 1 = 0 to 5V, 0 to 20 mA; 2 = –5 to +5V, –20 to +20 mA; 3 = –10 to +10V

Table 4.B
Field Descriptions for 1771-IL Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Module Name	Assign a unique name to every 1771-IL module. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Floating Point Data Block Address	Assign an address for the floating point data block. The floating point data block file number must be 1 greater than the integer data block file number. The floating point element must be the same as the integer element.	
Timer and Block Transfer Element Number	Assign a unique element number to each 1771-IL module. The device driver requires one PLC timer element (in file T43) and two block transfer elements (in files BT44 and BT45). The element number must be identical in all three files.	Integer 0 - 999
Description	Describe the function of every 1771-IL module. The description can contain a maximum of 32 characters (letters and/or numbers).	
Module Enabled	Enable or disable each 1771-IL module. To enable the 1771-IL module, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
STI/Non-STI	If this analog function will be in a selectable timed interrupt routine, enter a 1; if in a non-selectable timed interrupt routine, enter a 0.	Binary 0 or 1
Rack Number	Assign a rack number to every 1771-IL module.	Integer 0 - 27[1] (octal)
Group Number	Assign a group number to every 1771-IL module.	Integer 0 - 7

Table 4.B
Field Descriptions for 1771-IL Worksheet Continued

For this field:	Do this:	Value:
Slot Number	Assign a slot number to every 1771-IL module.	Integer 0 - 1
Real-Time Sample Rate	Assign a real-time sample rate to each 1771-IL module. The rate applies to all inputs within the module.	Integer 0 - 3.1 (seconds)
Filter Time-Constant	Assign a filter time-constant to each 1771-IL module. The time-constant applies to all inputs within the module. Time-constant (in seconds) = (value / 100). For example, 99 corresponds to 0.99 seconds.	Integer 0 - 99
Input-*n* Range	Individually assign a range to each input ($0 \le n \le 7$) from the chart below. Range Description 0 1 to 5 V or 4 to 20 mA 1 0 to 5 V or 0 to 20 mA 2 −5 to +5 V or −20 to +20 mA 3 −10 to +10 V	Integer 0 - 3
Input-*n* Minimum Scaling Value	Individually assign a minimum scaling value (in engineering units) to each input ($0 \le n \le 7$). This value corresponds to the minimum raw input of the module (4 mA for example).	Float
Input-*n* Maximum Scaling Value	Individually assign a maximum scaling value (in engineering units) to each input ($0 \le n \le 7$). This value corresponds to the maximum raw input of the module (20 mA for example).	Float
Input-*n* Override Enable	Individually enable or disable override for each input ($0 \le n \le 7$). To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*n* Override Value	Individually assign an override value (in engineering units) to each input ($0 \le n \le 7$).	Float

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Completing Worksheets for IR Modules

To plan your requirements for 1771-IR RTD modules, use worksheet 4.3, 1771-IR Assignments. See appendix B for blank copies. Figure 4.3 shows a sample page of a completed worksheet. Table 4.C explains each line on the worksheet. To use worksheet 4.3, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.

2. Use as many worksheets as necessary to document all of the 1771-IR modules in the system.

3. Fill in the information requested for each 1771-IR module.

Figure 4.3
Sample of Completed 1771-IR Worksheet

PCO Worksheet 4.3
1771-IR Assignments

Date *8/6/92*
Page *1 of 1*

Module Name	*IR240*			
Integer Data Block Address	*N208:60*			
Floating Point Data Block Address	*F209:60*			
Timer and Block Transfer Element Number	*5*			
Description	*IR IN RACK 2, GROUP 4, SLOT 0*			
Module Enabled (1=Yes/0=No)	*1*			
STI/Non-STI (1=STI/0=Non-STI)	*0*			
Rack Number[1]	*2*			
Group Number (0-7)	*4*			
Slot Number (0-1)	*0*			
Unit of Measure (0=°C/1=°F/2=Ohms)	*0*			
RTD Type/Ohms Resolution (In °C/°F mode: 0=Platinum/1=Copper In Ohms mode: 0=30mΩ per count/1=10mΩ per count)	*0*			
Real-Time Sample Rate (0-3.1 seconds)	*1.0*			
Copper RTD Resistance (9.00-11.00)	*0*			
Input-0 Readout in Ohms (1=Yes/0=No)	*0*			
Input-1 Readout in Ohms (1=Yes/0=No)	*0*			
Input-2 Readout in Ohms (1=Yes/0=No)	*0*			
Input-3 Readout in Ohms (1=Yes/0=No)	*0*			
Input-4 Readout in Ohms (1=Yes/0=No)	*0*			
Input-5 Readout in Ohms (1=Yes/0=No)	*1*			
Input-0 Override Enable (1=Yes/0=No)	*0*			
Input-0 Override Value	*0*			
Input-1 Override Enable (1=Yes/0=No)	*0*			
Input-1 Override Value	*0*			
Input-2 Override Enable (1=Yes/0=No)	*0*			
Input-2 Override Value	*0*			
Input-3 Override Enable (1=Yes/0=No)	*0*			
Input-3 Override Value	*0*			
Input-4 Override Enable (1=Yes/0=No)	*0*			
Input-4 Override Value	*0*			
Input-5 Override Enable (1=Yes/0=No)	*0*			
Input-5 Override Value	*0*			

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Table 4.C
Field Descriptions for 1771-IR Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Module Name	Assign a unique name to every 1771-IR module. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Floating Point Data Block Address	Assign an address for the floating point data block. The floating point data block file number must be 1 greater than the integer data block file number. The floating point element must be the same as the integer element.	
Timer and Block Transfer Element Number	Assign a unique element number to each 1771-IL module. The device driver requires one PLC timer element (in file T43) and two block transfer elements (in files BT44 and BT45). The element number must be identical in all three files.	Integer 0 - 999
Description	Describe the function of every 1771-IR module. The description can contain a maximum of 32 characters (letters and/or numbers).	
Module Enabled	Enable or disable each 1771-IR module. To enable the module, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
STI/Non-STI	If this analog function will be in a selectable timed interrupt routine, enter a 1; if in a non-selectable timed interrupt routine, enter a 0.	Binary 0 or 1
Rack Number	Assign a rack number to every 1771-IR module.	Integer 0 - 27[1] (octal)
Group Number	Assign a group number to every 1771-IR module.	Integer 0 - 7
Slot Number	Assign a slot number to every 1771-IR module.	Integer 0 - 1
Unit of Measure	Assign a unit of measure to each 1771-IR module from the chart below. This selection applies to all inputs within a module. Option / Description: 0 degrees C; 1 degrees F; 2 Ohms	Integer 0 - 2
RTD Type/Ohms Resolution	Assign a type (for temperature readout) or a resolution (for Ohms readout) to each 1771-IR module from the chart below. This selection applies to all inputs within a module. Option / Temperature Mode / Ohms Mode 0 / Platinum / 30 mΩ/count 1 / Copper / 10 mΩ/count	Binary 0 or 1
Real-Time Sample Rate	Assign a real-time sample rate to each 1771-IL module. The rate applies to all inputs within a module.	Integer 0 - 3.1 (seconds)
Copper RTD Resistance	Specify the resistance of the copper RTD in Ohms. Irrelevant if Unit of Measure = 2 and/or if RTD Type/Ohms Resolution = 0.	Float 9.00 - 11.00
Input-*n* Readout in Ohms	Individually specify whether or not to override the global units of measure setting for each input ($0 \leq n \leq 5$). To override a global temperature setting and use Ohms, enter a 1; otherwise, enter a 0. Irrelevant if Unit of Measure = 2.	Binary 0 or 1

Table 4.C
Field Descriptions for 1771-IR Worksheet Continued

For this field:	Do this:	Value:
Input-*n* Override Enable	Individually enable or disable override for each input ($0 \leq n \leq 5$). To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*n* Override Value	Individually assign an override value (in engineering units) to each input ($0 \leq n \leq 5$). Irrelevant if the corresponding Input-*n* Override Enable = 0.	Float

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Completing Worksheets for IXE Modules

To plan your requirements for 1771-IXE thermocouple modules, use worksheet 4.4, 1771-IXE Assignments. See appendix B for blank copies. Figure 4.4 shows a sample page of a completed worksheet. Table 4.D explains each line on the worksheet. To use worksheet 4.4, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.
2. Use as many worksheets as necessary to document all of the 1771-IXE modules in the system.
3. Fill in the information requested for each 1771-IXE module.

Figure 4.4
Sample of Completed 1771-IXE Worksheet

PCO Worksheet 4.4
1771-IXE Assignments

Date *8/6/92*
Page *1 of 2*

Module Name	*TEMPS_110*			
Integer Data Block Address	*N210:0*			
Floating Point Data Block Address	*F211:0*			
Timer and Block Transfer Element Number	*6*			
Description	*TEMPERATURES, RGS=110*			
Module Enabled (1=Yes/0=No)	*1*			
STI/Non-STI (1=STI/0=Non-STI)	*1*			
Rack Number[1]	*1*			
Group Number (0-7)	*1*			
Slot Number (0-1)	*0*			
Inputs 0-3 Type (0=mV/1=E/2=J/3=K/4=T/5=R/6=S)	*3*			
Inputs 4-7 Type (0=mV/1=E/2=J/3=K/4=T/5=R/6=S)	*3*			
Temperature Scale (1=°F/0=°C)	*1*			
Real-Time Sample Rate (0-3.1 seconds)	*0*			
Input-0 Override Enable (1=Yes/0=No)	*0*			
Input-0 Override Value	*0*			
Input-0 Alarm Enable (1=Yes/0=No)	*1*			
Input-0 Low Alarm Value	*0*			
Input-0 High Alarm Value	*500*			
Input-1 Override Enable (1=Yes/0=No)	*0*			
Input-1 Override Value	*0*			
Input-1 Alarm Enable (1=Yes/0=No)	*0*			
Input-1 Low Alarm Value	*0*			
Input-1 High Alarm Value	*0*			
Input-2 Override Enable (1=Yes/0=No)	*0*			
Input-2 Override Value	*0*			
Input-2 Alarm Enable (1=Yes/0=No)	*0*			
Input-2 Low Alarm Value	*0*			
Input-2 High Alarm Value	*0*			
Input-3 Override Enable (1=Yes/0=No)	*0*			
Input-3 Override Value	*0*			
Input-3 Alarm Enable (1=Yes/0=No)	*1*			
Input-3 Low Alarm Value	*80*			
Input-3 High Alarm Value	*190*			
Input-4 Override Enable (1=Yes/0=No)	*0*			
Input-4 Override Value	*0*			
Input-4 Alarm Enable (1=Yes/0=No)	*0*			
Input-4 Low Alarm Value	*0*			
Input-4 High Alarm Value	*0*			
Input-5 Override Enable (1=Yes/0=No)	*0*			

PCO Worksheet 4.4
1771-IXE Assignments Continued

Date *8/6/92*
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Input-5 Override Value	*0*			
Input-5 Alarm Enable (1=Yes/0=No)	*0*			
Input-5 Low Alarm Value	*0*			
Input-5 High Alarm Value	*0*			
Input-6 Override Enable (1=Yes/0=No)	*0*			
Input-6 Override Value	*0*			
Input-6 Alarm Enable (1=Yes/0=No)	*0*			
Input-6 Low Alarm Value	*0*			
Input-6 High Alarm Value	*0*			
Input-7 Override Enable (1=Yes/0=No)	*0*			
Input-7 Override Value	*0*			
Input-7 Alarm Enable (1=Yes/0=No)	*0*			
Input-7 Low Alarm Value	*0*			
Input-7 High Alarm Value	*0*			
Cold Junction Override Enable (1=Yes/0=No)	*0*			
Cold Junction Override Value	*0*			

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Table 4.D
Field Descriptions for 1771-IXE Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Module Name	Assign a unique name to every 1771-IXE module. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Floating Point Data Block Address	Assign an address for the floating point data block. The floating point data block file number must be 1 greater than the integer data block file number. The floating point element must be the same as the integer element.	
Timer and Block Transfer Element Number	Assign a unique element number to each 1771-IXE module. The device driver requires one PLC timer element (in file T43) and two block transfer elements (in files BT44 and BT45). The element number must be identical in all three files.	Integer 0 - 999
Description	Describe the function of every 1771-IXE module. The description can contain a maximum of 32 characters (letters and/or numbers).	
Module Enabled	Enable or disable each 1771-IXE module. To enable the module, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
STI/Non-STI	If this analog function will be in a selectable timed interrupt routine, enter a 1; if in a non-selectable timed interrupt routine, enter a 0.	Binary 0 or 1
Rack Number	Assign a rack number to every 1771-IXE module.	Integer 0 - 27[1] (octal)

Table 4.D
Field Descriptions for 1771-IXE Worksheet Continued

For this field:	Do this:	Value:
Group Number	Assign a group number to every 1771-IXE module.	Integer 0 - 7
Slot Number	Assign a slot number to every 1771-IXE module.	Integer 0 - 1
Inputs 0-3 Type	Assign the type of thermocouple for inputs 0 through 3 from the chart below. Option Description Option Description 0 millivolt 4 T-type TC 1 E-type TC 5 R-type TC 2 J-type TC 6 S-type TC 3 K-type TC	Integer 0 - 6
Inputs 4-7 Type	Assign the type of thermocouple for inputs 4 through 7 from the chart below. Option Description Option Description 0 millivolt 4 T-type TC 1 E-type TC 5 R-type TC 2 J-type TC 6 S-type TC 3 K-type TC	Integer 0 - 6
Temperature Scale	Assign a temperature scale to each 1771-IXE module. This selection applies to all inputs in a module. For readout in degrees F, enter a 1; for degrees C, enter a 0. Irrelevant if Inputs 0-3 Type = 0 and/or Inputs 4-7 Type = 0, then readout is in millivolts for these channels.	Binary 0 or 1
Real-Time Sample Rate	Assign a real-time sample rate to each 1771-IXE module. The rate applies to all inputs within a module.	Integer 0 - 3.1 (seconds)
Input-*n* Override Enable	Individually enable or disable override for each input ($0 \leq n \leq 7$). To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*n* Override Value	Individually assign an override value (in engineering units) to each input ($0 \leq n \leq 7$). Irrelevant if the corresponding Input-*n* Override Enable = 0.	Float
Input-*n* Alarm Enable	Individually enable or disable alarms for each input ($0 \leq n \leq 7$). To enable alarms, enter a 1; to disable them, enter a 0.	Binary 0 or 1
Input-*n* Low Alarm Value	Individually assign a value for low alarm limit (in engineering units) to each input ($0 \leq n \leq 7$). Irrelevant if the corresponding Input-*n* Alarm Enable = 0.	Float
Input-*n* High Alarm Value	Individually assign a value for high alarm limit (in engineering units) to each input ($0 \leq n \leq 7$). Irrelevant if the corresponding Input-*n* Alarm Enable = 0.	Float
Cold Junction Override Enable	Enable or disable cold-junction override for each 1771-IXE module. To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Cold Junction Override Value	Assign an override value (in engineering units) to each 1771-IXE module. Irrelevant if Cold Junction Override Enable = 0.	Float

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Completing Worksheets for IXHR Modules

To plan your requirements for 1771-IXHR high-resolution thermocouple modules, use worksheet 4.5, 1771-IXHR Assignments. See appendix B for blank copies. Figure 4.5 shows a sample page of a completed worksheet. Table 4.E explains each line on the worksheet. To use worksheet 4.5, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.

2. Use as many worksheets as necessary to document all of the 1771-IXHR modules in the system.

3. Fill in the information requested for each 1771-IXHR module.

Figure 4.5
Sample of Completed 1771-IXHR Worksheet

PCO Worksheet 4.5
1771-IXHR Assignments

Date *8/6/92*
Page *1 of 2*

Module Name	*IXHR250*			
Integer Data Block Address	*N212:80*			
Floating Point Data Block Address	*F213:80*			
Timer and Block Transfer Element Number	*9*			
Description	*IXHR IN RACK 2, GROUP 5, SLOT 0*			
Module Enabled (1=Yes/0=No)	*1*			
STI/Non-STI (1=STI/0=Non-STI)	*0*			
Rack Number[1]	*2*			
Group Number (0-7)	*5*			
Slot Number (0-1)	*0*			
Inputs 0-3 Type (0=mV/1=E/2=J/3=K/4=T/5=R/6=S/7=B)	*3*			
Inputs 4-7 Type (0=mV/1=E/2=J/3=K/4=T/5=R/6=S/7=B)	*2*			
Temperature Scale (1=°F/0=°C)	*0*			
Real-Time Sample Rate (0-3.175 seconds)	*0*			
Zoom Enable (1=Yes/0=No)	*0*			
Inputs 0-3 Zoom Value (–70 to +70)	*0*			
Inputs 4-7 Zoom Value (–70 to +70)	*0*			
Inputs 0-3 Filter Value (0-127)	*0*			
Inputs 4-7 Filter Value (0-127)	*10*			
Input-0 Override Enable (1=Yes/0=No)	*0*			
Input-0 Override Value	*0*			
Input-0 Low Alarm Value	*0*			
Input-0 High Alarm Value	*200*			
Input-1 Override Enable (1=Yes/0=No)	*0*			
Input-1 Override Value	*0*			
Input-1 Low Alarm Value	*0*			
Input-1 High Alarm Value	*0*			
Input-2 Override Enable (1=Yes/0=No)	*0*			
Input-2 Override Value	*0*			
Input-2 Low Alarm Value	*0*			
Input-2 High Alarm Value	*0*			
Input-3 Override Enable (1=Yes/0=No)	*0*			
Input-3 Override Value	*0*			
Input-3 Low Alarm Value	*0*			

PCO Worksheet 4.5
1771-IXHR Assignments Continued

Date 8/6/92
Page 2 of 2

Input-3 High Alarm Value	0			
Input-4 Override Enable (1=Yes/0=No)	0			
Input-4 Override Value	0			
Input-4 Low Alarm Value	0			
Input-4 High Alarm Value	0			
Input-5 Override Enable (1=Yes/0=No)	0			
Input-5 Override Value	0			
Input-5 Low Alarm Value	0			
Input-5 High Alarm Value	0			
Input-6 Override Enable (1=Yes/0=No)	0			
Input-6 Override Value	0			
Input-6 Low Alarm Value	0			
Input-6 High Alarm Value	0			
Input-7 Override Enable (1=Yes/0=No)	0			
Input-7 Override Value	0			
Input-7 Low Alarm Value	0			
Input-7 High Alarm Value	0			
Cold Junction Override Enable (1=Yes/0=No)	0			
Cold Junction Override Value	0			

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Table 4.E
Field Descriptions for 1771-IXHR Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Module Name	Assign a unique name to every 1771-IXHR module. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Floating Point Data Block Address	Assign an address for the floating point data block. The floating point data block file number must be 1 greater than the integer data block file number. The floating point element must be the same as the integer element.	
Timer and Block Transfer Element Number	Assign a unique element number to each 1771-IXHR module. The device driver requires one PLC timer element (in file T43) and two block transfer elements (in files BT44 and BT45). The element number must be identical in all three files.	Integer 0 - 999
Description	Describe the function of every 1771-IXHR module. The description can contain a maximum of 32 characters (letters and/or numbers).	
Module Enabled	Enable or disable each 1771-IXHR module. To enable the module, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
STI/Non-STI	If this analog function will be in a selectable timed interrupt routine, enter a 1; if in a non-selectable timed interrupt routine, enter a 0.	Binary 0 or 1

Table 4.E
Field Descriptions for 1771-IXHR Worksheet Continued

For this field:	Do this:	Value:
Rack Number	Assign a rack number to every 1771-IXHR module.	Integer 0 - 27[1] (octal)
Group Number	Assign a group number to every 1771-IXHR module.	Integer 0 - 7
Slot Number	Assign a slot number to every 1771-IXHR module.	Integer 0 - 1
Inputs 0-3 Type	Assign a type of thermocouple for inputs 0 through 3 from the chart below. Option / Description / Option / Description 0 millivolt / 4 T-type TC 1 E-type TC / 5 R-type TC 2 J-type TC / 6 S-type TC 3 K-type TC / 7 B-type TC	Integer 0 - 7
Inputs 4-7 Type	Assign a type of thermocouple for inputs 4 through 7 from the chart below. Option / Description / Option / Description 0 millivolt / 4 T-type TC 1 E-type TC / 5 R-type TC 2 J-type TC / 6 S-type TC 3 K-type TC / 7 B-type TC	Integer 0 - 7
Temperature Scale	Assign a temperature scale to each 1771-IXHR module. This selection applies to all inputs in a module. For readout in degrees F, enter a 1; for degrees C, enter a 0. Irrelevant if Inputs 0-3 Type = 0 and/or Inputs 4-7 Type = 0, then readout is in millivolts for those inputs.	Binary 0 or 1
Real-Time Sample Rate	Assign a real-time sample rate to each 1771-IXHR module. The rate applies to all inputs within a module.	Integer 0-3.175 (seconds)
Zoom Enable	Enable or disable zoom mode for inputs of type millivolt. To enable zoom mode, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Inputs 0-3 Zoom Value	Specify the center value of zoom for inputs 0 through 3.	Integer –70 to +70
Inputs 4-7 Zoom Value	Specify the center value of zoom for inputs 4 through 7.	Integer –70 to +70
Inputs 0-3 Filter Value	Specify the filter value for inputs 0 through 3. The time-constant (in seconds) of the filter = 0.025 • (value + 1). For example, 127 corresponds to 3.2 seconds.	Integer 0 to 255
Inputs 4-7 Filter Value	Specify the filter value for inputs 4 through 7. The time-constant (in seconds) of the filter = 0.025 • (value + 1). For example, 127 corresponds to 3.2 seconds.	Integer 0 to 255
Input-*n* Override Enable	Individually enable or disable override for each input ($0 \le n \le 7$). To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*n* Override Value	Individually assign an override value (in engineering units) to each input ($0 \le n \le 7$). Irrelevant if the corresponding Input-*n* Override Enable = 0.	Float
Input-*n* Low Alarm Value	Individually assign a value for low alarm limit (in engineering units) to each input ($0 \le n \le 7$). To disable this alarm, set the low alarm value equal to the high alarm value.	Float
Input-*n* High Alarm Value	Individually assign a value for high alarm limit (in engineering units) to each input ($0 \le n \le 7$). To disable this alarm, set the low alarm value equal to the high alarm value.	Float
Cold Junction Override Enable	Enable or disable cold-junction override for each 1771-IXHR module. To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Cold Junction Override Value	Assign an override value (in engineering units) to each 1771-IXHR module. Irrelevant if Cold Junction Override Enable = 0.	Float

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Completing Worksheets for QRD Modules

To plan your requirements for 1771-QRD pulse modules, use worksheet 4.6, 1771-QRD Assignments. See appendix B for blank copies. Figure 4.6 shows a sample page of a completed worksheet. Table 4.F explains each line on the worksheet. To use worksheet 4.6, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.

2. Use as many worksheets as necessary to document all of the 1771-QRD modules in the system.

3. Fill in the information requested for each 1771-QRD module.

Figure 4.6
Sample of Completed 1771-QRD Worksheet

PCO Worksheet 4.6
1771-QRD Assignments

Date 8/6/92
Page 1 of 1

Module Name	QRD251			
Integer Data Block Address	N214:55			
Floating Point Data Block Address	F215:55			
Timer and Block Transfer Element Number	11			
Description	PULSE INPUTS, RGS=251			
Module Enabled (1=Yes/0=No)	1			
STI/Non-STI (1=STI/0=Non-STI)	0			
Allow Totalizer Resets from ControlView (1=Yes/0=No)	1			
Rack Number[1]	2			
Group Number (0-7)	5			
Slot Number (0-1)	1			
Input-0 Rate Scaling Value	1			
Input-0 Total Scaling Value	1			
Input-0 Rate Override Enable (1=Yes/0=No)	0			
Input-0 Rate Override Value	0			
Input-0 Total Override Enable (1=Yes/0=No)	0			
Input-0 Total Override Value	0			
Input-1 Rate Scaling Value	.013			
Input-1 Total Scaling Value	.0067			
Input-1 Rate Override Enable (1=Yes/0=No)	0			
Input-1 Rate Override Value	0			
Input-1 Total Override Enable (1=Yes/0=No)	0			
Input-1 Total Override Value	0			
Input-2 Rate Scaling Value	1			
Input-2 Total Scaling Value	1			
Input-2 Rate Override Enable (1=Yes/0=No)	0			
Input-2 Rate Override Value	0			
Input-2 Total Override Enable (1=Yes/0=No)	0			
Input-2 Total Override Value	0			
Input-3 Rate Scaling Value	1			
Input-3 Total Scaling Value	1			
Input-3 Rate Override Enable (1=Yes/0=No)	0			
Input-3 Rate Override Value	0			
Input-3 Total Override Enable (1=Yes/0=No)	0			
Input-3 Total Override Value	0			

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Table 4.F
Field Descriptions for 1771-QRD Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Module Name	Assign a unique name to every 1771-QRD module. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Floating Point Data Block Address	Assign an address for the floating point data block. The floating point data block file number must be 1 greater than the integer data block file number. The floating point element must be the same as the integer element.	
Timer and Block Transfer Element Number	Assign a unique element number to each 1771-QRD module. The device driver requires one PLC timer element (in file T43) and two block transfer elements (in files BT44 and BT45). The element number must be identical in all three files.	Integer 0 - 999
Description	Describe the function of every 1771-QRD module. The description can contain a maximum of 32 characters (letters and/or numbers).	
Module Enabled	Enable or disable each 1771-QRD module. To enable the module, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
STI/Non-STI	If this analog function will be in a selectable timed interrupt routine, enter a 1; if in a non-selectable timed interrupt routine, enter a 0.	Binary 0 or 1
Allow Totalizer Resets from ControlView	Enable or disable totalizer resets from ControlView. To enable reset, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Rack Number	Assign a rack number to every 1771-QRD module.	Integer 0 - 27[1] (octal)
Group Number	Assign a group number to every 1771-QRD module.	Integer 0 - 7
Slot Number	Assign a slot number to every 1771-QRD module.	Integer 0 - 1
Input-*n* Rate Scaling Value	Individually assign a rate scaling value (in engineering units) to each input ($0 \le n \le 3$).	Float
Input-*n* Total Scaling Value	Individually assign a total scaling value (in engineering units) to each input ($0 \le n \le 3$).	Float
Input-*n* Rate Override Enable	Individually enable or disable rate override for each input ($0 \le n \le 3$). To enable rate override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*n* Rate Override Value	Individually assign a rate override value (in engineering units) to each input ($0 \le n \le 3$). Irrelevant if the corresponding Input-*n* Rate Override Enable = 0.	Float
Input-*n* Total Override Enable	Individually enable or disable total override for each input ($0 \le n \le 3$). To enable total override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*n* Total Override Value	Individually assign a total override value (in engineering units) to each input ($0 \le n \le 3$). Irrelevant if the corresponding Input-*n* Total Override Enable = 0.	Float

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Completing Worksheets for OFE Modules

To plan your requirements for 1771-OFE analog output modules, use worksheet 4.7, 1771-OFE Assignments. See appendix B for blank copies. Figure 4.7 shows a sample page of a completed worksheet. Table 4.G explains each line on the worksheet. To use worksheet 4.7, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.
2. Use as many worksheets as necessary to document all of the 1771-OFE modules in the system.
3. Fill in the information requested for each 1771-OFE module.

Figure 4.7
Sample of Completed 1771-OFE Worksheet

PCO Worksheet 4.7
1771-OFE Assignments

Date *8/6/92*
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Module Name	*PID_OUTS*			
Integer Data Block Address	*N216:0*			
Floating Point Data Block Address	*F217:0*			
Timer and Block Transfer Element Number	*12*			
Description	*PID OUT-PUTS, RGS=140*			
Module Enabled (1=Yes/0=No)	*1*			
STI/Non-STI (1=STI/0=Non-STI)	*1*			
Rack Number[1]	*1*			
Group Number (0-7)	*4*			
Slot Number (0-1)	*0*			
Block Transfer Read Mode (1=Continuous/0=On-Demand)	*0*			
Output-0 Minimum Scaling Value	*0*			
Output-0 Maximum Scaling Value	*100*			
Output-0 Data Source Selector (1=PID/0=Alt)	*1*			
Output-0 PID Data Block File Number (125-998)	*202*			
Output-0 PID Data Block Element Number (0-920)	*0*			
Output-1 Minimum Scaling Value	*0*			
Output-1 Maximum Scaling Value	*100*			
Output-1 Data Source Selector (1=PID/0=Alt)	*0*			
Output-1 PID Data Block File Number (125-998)	*125*			
Output-1 PID Data Block Element Number (0-920)	*0*			
Output-2 Minimum Scaling Value	*0*			
Output-2 Maximum Scaling Value	*100*			
Output-2 Data Source Selector (1=PID/0=Alt)	*0*			
Output-2 PID Data Block File Number (125-998)	*125*			
Output-2 PID Data Block Element Number (0-920)	*0*			
Output-3 Minimum Scaling Value	*0*			
Output-3 Maximum Scaling Value	*100*			
Output-3 Data Source Selector (1=PID/0=Alt)	*0*			
Output-3 PID Data Block File Number (125-998)	*125*			
Output-3 PID Data Block Element Number (0-920)	*0*			

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Table 4.G
Field Descriptions for 1771-OFE Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Module Name	Assign a unique name to every 1771-OFE module. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Floating Point Data Block Address	Assign an address for the floating point data block. The floating point data block file number must be 1 greater than the integer data block file number. The floating point element must be the same as the integer element.	
Timer and Block Transfer Element Number	Assign a unique element number to each 1771-OFE module. The device driver requires one PLC timer element (in file T43) and two block transfer elements (in files BT44 and BT45). The element number must be identical in all three files.	Integer 0 - 999
Description	Describe the function of every 1771-OFE module. The description can contain a maximum of 32 characters (letters and/or numbers).	
Module Enabled	Enable or disable each 1771-OFE module. To enable the module, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
STI/Non-STI	If this analog function will be in a selectable timed interrupt routine, enter a 1; if in a non-selectable timed interrupt routine, enter a 0.	Binary 0 or 1
Rack Number	Assign a rack number to every 1771-OFE module.	Integer 0 - 27[1] (octal)
Group Number	Assign a group number to every 1771-OFE module.	Integer 0 - 7
Slot Number	Assign a slot number to every 1771-OFE module.	Integer 0 - 1
Block Transfer Read Mode	Specify either continuous or on-demand. For continuous mode, enter a 1; for on-demand mode, enter a 0.	Binary 0 or 1
Output-*n* Minimum Scaling Value	Individually assign a minimum scaling value (in engineering units) to each output ($0 \leq n \leq 3$). This value corresponds to minimum output (4 mA for example). For the –10 V to +10 V range, the minimum scaling value corresponds to the zero output point.	Float
Output-*n* Maximum Scaling Value	Individually assign a maximum scaling value (in engineering units) to each output ($0 \leq n \leq 3$). The maximum scaling value corresponds to maximum output (20 mA for example).	Float
Output-*n* Data Source Selector	Individually specify whether the value of each output ($0 \leq n \leq 3$) is obtained from an PID function or an alternate location. If it is from an PID function, enter a 1; if from an alternate location, enter a 0.	Binary 0 or 1
Output-*n* PID Data Block File Number	Individually specify the PID loop file number for each output ($0 \leq n \leq 3$). Irrelevant if the corresponding Output-*n* Data Source Selector = 0.	Integer 125 - 998
Output-*n* PID Data Block Element Number	Individually specify PID loop element number for each output ($0 \leq n \leq 3$). Irrelevant if the corresponding Output-*n* Data Source Selector = 0.	Integer 0 - 920

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Completing Worksheets for N-series Modules

To plan your requirements for N-series modules, use worksheet 4.8, N-series Assignments. See appendix B for blank copies. Figure 4.8 shows a sample page of a completed worksheet. Table 4.H explains each line on the worksheet. To use worksheet 4.8, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.
2. Use as many worksheets as necessary to document all of the N-series modules in the system.
3. Fill in the information requested for each N-series module.

Figure 4.8
Sample of Completed N-series Worksheet

PCO Worksheet 4.8
N-series Assignments (Part A)

Date *8/6/92*
Page *1 of 3*

Module Name	*NBRC150*
Integer Data Block Address	*N218:0*
Floating Point Data Block Address	*F219:0*
Description	*NBRC MODULE IN RGS=150*
N-series Enable (1=Yes/0=No)	*1*
STI/Non-STI Selection (1=STI/0=Non-STI)	*0*
Rack Number[1]	*1*
Group Number (0-7)	*5*
Slot Number (0-1)	*0*
Timer and Block Transfer Element Used	*14*
Real-Time Sample Rate (0, 0.100-10.000 seconds)	*.4*
Temperature Scale (1=°F/0=°C)	*1*
Cold Junction Alarm Enable (1=Yes/0=No)	*0*
Cold Junction Override Enbable (1=1/0–No)	*0*
Cold Junction Override Value	*0*

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

PCO Worksheet 4.8
N-series Assignments (Part B)

Date *8/6/92*
Page *2 of 3*

Channel Type	Channel 0	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7
±5 Volt Input Channel Fields								
Input X Override Enable (1=Yes/0=No)								
Input X Override Value								
Input X Minimum Scaling Value								
Input X Maximum Scaling Value								
Input X Filter Time-Constant (0, 0.1-9.9 seconds)								
Input X Alarm Enable (1=Yes/0=No)								
Input X Low Alarm Value								
Input X High Alarm Value								
Input X Rate Alarm Value								
Input X Alarm Deadband								
Thermocouple Input Channel Fields								
Input X Override Enable (1=Yes/0=No)								
Input X Override Value								
Input X Filter Time-Constant (0, 0.1-9.9 seconds)								
Input X Thermocouple Type[1]								
Input X Alarm Enable (1=Yes/0=No)								
Input X Low Alarm Value								
Input X High Alarm Value								
Input X Rate Alarm Value								
Input X Alarm Deadband								
RTD Input Channel Fields								
Input X Override Enable (1=Yes/0=No)			0	0	0	0	0	0
Input X Override Value			0	0	0	0	0	0
Input X Filter Time-Constant (0, 0.1-9.9 seconds)			0	0	0	0	0	0
Input X RTD Type (0-4)[2]			2	2	2	2	0	0
Input X 10 Ohm Offset (–.99 to +.99)			0	0	0	0	0	0
Input X Alarm Enable (1=Yes/0=No)			1	1	0	1	0	0
Input X Low Alarm Value			0	100	0	0	0	0
Input X High Alarm Value			150	200	0	212	0	0
Input X Rate Alarm Value			0	1	0	0	0	0
Input X Alarm Deadband			5	4	0	5	0	0

PCO Worksheet 4.8
N-series Assignments (Part B Continued)

Date 8/6/92
Page 3 of 3

Channel Type	Channel 0	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7
±10 Volt Output Channel Fields								
Output X Data Source Selector (1=PID/0=Alternate)								
Output X PID Data Block File Number (125-998)								
Output X PID Data Block Element Number (0-920)								
Output X Minimum Scaling Value								
Output X Maximum Scaling Value								
Output X Alarm Enable (1=Yes/0=No)								
Output X Low Clamp Value								
Output X High Clamp Value								
Output X Ramp Rate Limit (0-200%)								
Output X Reset State (0-3)[3]								
Output X Reset Value								
4-20 mA Output Channel Fields								
Output X Data Source Selector (1=PID/0=Alternate)	0	1						
Output X PID Data Block File Number (125-998)	125	300						
Output X PID Data Block Element Number (0-920)	0	320						
Output X Minimum Scaling Value	0	0						
Output X Maximum Scaling Value	100	100						
Output X Alarm Enable (1=Yes/0=No)	0	0						
Output X Low Clamp Value	0	0						
Output X High Clamp Value	0	0						
Output X Ramp Rate Limit (0-200%)	0	0						
Output X Reset State (0-3)[3]	0	3						
Output X Reset Value	0	50						

[1] 0=mv, 1=B, 2=E, 3=J, 4=K, 5=R, 6=S, 7=T
[2] RTD Types: 0=Ohms/1=100-Ohm Pt. Eur. Std./2=100-Ohm Pt. U.S. Std./3=10-Ohm Copper/4=120-Ohm Nickel
[3] Output Reset State: 0=last state, 1=minimum, 2=maximum, 3=user reset value

Table 4.H
Field Descriptions for N-series Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this:	Do this:	Value:
Module Name	Assign a unique name to every N-series module. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Floating Point Data Block Address	Assign an address for the floating point data block. The floating point element must be the same as the integer element. The number of the floating point data block must be one greater than that of the integer data block.	
Description	Describe the function of every N-series module. The description can contain a maximum of 32 characters (letters and/or numbers).	
Module Enabled	Enable or disable each N-series module. To enable the module, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
STI/Non-STI	If this analog function will be in a selectable timed interrupt routine, enter a 1; if in a non-selectable timed interrupt routine, enter a 0.	Binary 0 or 1
Rack Number	Assign a rack number to every N-series module.	Integer 0 - 27[1] (octal)
Group Number	Assign a group number to every N-series module.	Integer 0 - 7
Slot Number	Assign a slot number to every N-series module.	Integer 0 - 1
Timer and Block Transfer Element Number	Assign a unique element number to each N-series module. The N-series function requires one PLC timer element (in file T43) and two block transfer elements (in files BT44 and BT45). The element number must be identical in all three files.	Integer 0 - 999
Real-Time Sample Rate	Assign a real-time sample rate to each N-series module. The rate applies to all inputs within the module. If this analog function will be in a STI, the RTS rate should be set to 0.	Integer 0, 0.100-10.000 (seconds)
Temperature Scale	Assign a temperature scale to each N-series module. This selection applies to all inputs in a module. For readout in degrees F, enter a 1; for degrees C, enter a 0. Irrelevant if Thermocouple Type = 0, then readout is in millivolts or ohms for these channels.	Binary 0 or 1
Cold Junction Alarm Enable	Enable or disable cold-junction alarm for each N-series module. To enable alarm, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Cold Junction Override Enable	Enable or disable cold-junction override for each 1771-IXE module. To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Cold Junction Override Value	Assign an override value (in engineering units) to each 1771-IXE module. Irrelevant if Cold Junction Override Enable = 0.	Float

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Table 4.H
Field Descriptions for N-series Worksheet Continued

For this:	Do this:	Value:
±5 Volt Input Channel Fields		
Input-*x* Override Enable	Individually enable or disable override for each input ($0 \le x \le 7$). To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*x* Override Value	Individually assign an override value (in engineering units) to each input ($0 \le x \le 7$). Irrelevant if the corresponding Input *x* Override Enable = 0.	Float
Input-*x* Minimum Scaling Value	Individually assign a minimum scaling value (in engineering units) to each input ($0 \le x \le 7$). This value corresponds to the minimum raw input of the module (1V).	Float
Input-*x* Maximum Scaling Value	Individually assign a maximum scaling value (in engineering units) to each input ($0 \le x \le 7$). This value corresponds to the maximum raw input of the module (5V).	Float
Filter Time-Constant	Assign a filter time-constant in seconds to each N-series module. The value must be between 0.1 and 9.9, or 0.	Integer 0, 0.1 - 9.9
Input-*x* Alarm Enable	Individually enable or disable alarms for each input ($0 \le x \le 7$). To enable alarms, enter a 1; to disable them, enter a 0.	Binary 0 or 1
Input-*x* Low Alarm Value	Individually assign a value for low alarm limit (in engineering units) to each input ($0 \le x \le 7$). Irrelevant if the corresponding Input-*x* Alarm Enable = 0. Setting the low alarm value equal to the high alarm value disables this alarm.	Float
Input-*x* High Alarm Value	Individually assign a value for high alarm limit (in engineering units) to each input ($0 \le x \le 7$). Irrelevant if the corresponding Input-*x* Alarm Enable = 0. Setting the low alarm value equal to the high alarm value disables this alarm.	Float
Input-*x* Rate Alarm Value	Individually assign a rate alarm value (in engineering units) to each input ($0 \le x \le 7$). The value can be between 0.0004 and 0.5 times the Input *x* Maximum Scaling Value. Zero disables the rate alarm.	Float
Input-*x* Alarm Deadband	Specify the deadband value. The value should be less than or equal to 0.5 times the difference between the high and low alarm values. Irrelevant if the corresponding Input *x* Alarm Enable = 0.	Float

Table 4.H
Field Descriptions for N-series Worksheet Continued

For this:	Do this:	Value:
Thermocouple Input Channel Fields		
Input-*x* Override Enable	Individually enable or disable override for each input ($0 \le x \le 7$). To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*x* Override Value	Individually assign an override value (in engineering units) to each input ($0 \le x \le 7$). Irrelevant if the corresponding Input *x* Override Enable = 0.	Float
Filter Time-Constant	Assign a filter time-constant in seconds to each N-series module. The value must be between 0.1 and 9.9, or 0.	Integer 0, 0.1 - 9.9
Input *x* Thermocouple Type	Assign the type of thermocouple for each input from the chart below. Option / Description / Option / Description 0 millivolt / 4 K-type TC 1 B-type TC / 5 R-type TC 2 E-type TC / 6 S-type TC 3 J-type TC / 7 T-type TC	Integer 0 - 7
Input-*x* Alarm Enable	Individually enable or disable alarms for each input ($0 \le x \le 7$). To enable alarms, enter a 1; to disable them, enter a 0.	Binary 0 or 1
Input-*x* Low Alarm Value	Individually assign a value for low alarm limit (in engineering units) to each input ($0 \le x \le 7$). Irrelevant if the corresponding Input-*x* Alarm Enable = 0. Setting the low alarm value equal to the high alarm value disables this alarm.	Float
Input-*x* High Alarm Value	Individually assign a value for high alarm limit (in engineering units) to each input ($0 \le x \le 7$). Irrelevant if the corresponding Input *x* Alarm Enable = 0. Setting the low alarm value equal to the high alarm value disables this alarm.	Float
Input-*x* Rate Alarm Value	Individually assign a value for rate alarm value (in engineering units) to each input ($0 \le x \le 7$). The value should be between 0.84 and 1050°C, 1.512 and 1890°F, 0.08 and 100mV. Zero disables the rate alarm.	Float
Input-*x* Alarm Deadband	Specify the deadband value. The value should be less than or equal to 0.5 times the difference between the high and low alarm values. Irrelevant if the corresponding Input *x* Alarm Enable = 0.	Float

Table 4.H
Field Descriptions for N-series Worksheet Continued

For this:	Do this:	Value:
RTD Input Channel Fields		
Input-*x* Override Enable	Individually enable or disable override for each input ($0 \le x \le 7$). To enable override, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Input-*x* Override Value	Individually assign an override value (in engineering units) to each input ($0 \le x \le 7$). Irrelevant if the corresponding Input *x* Override Enable = 0.	Float
Filter Time-Constant	Assign a filter time-constant in seconds to each N-series module. The value must be between 0.1 and 9.9, or 0.	Integer 0, 0.1 - 9.9
Input *x* RTD Type	Assign a type to each input from the chart below. Option — Description 0 — Ohms 1 — 100Ω Platinum European standard 2 — 100Ω Platinum U.S. standard 3 — 10Ω Copper 4 — 120Ω Nickel	Integer 0 - 4
Input *x* 10 Ohm Offset	Individually assign an offset value to each input configured for a copper RTD. Irrelevant if Input *x* RTD Type ≠ 1.	Integer –.99 to +.99
Input-*x* Alarm Enable	Individually enable or disable alarms for each input ($0 \le x \le 7$). To enable alarms, enter a 1; to disable them, enter a 0.	Binary 0 or 1
Input-*x* Low Alarm Value	Individually assign a value for low alarm limit (in engineering units) to each input ($0 \le x \le 7$). Irrelevant if the corresponding Input-*x* Alarm Enable = 0. Setting the low alarm value equal to the high alarm value disables this alarm.	Float
Input-*x* High Alarm Value	Individually assign a value for high alarm limit (in engineering units) to each input ($0 \le x \le 7$). Irrelevant if the corresponding Input-*x* Alarm Enable = 0. Setting the low alarm value equal to the high alarm value disables this alarm.	Float
Input-*x* Rate Alarm Value	Individually assign a rate alarm value (in engineering units) to each input ($0 \le x \le 7$). The value should be between 0.44 and 550°C, 0.792 and 990°F, 0.2596 and 324.5 ohms. Zero disables the rate alarm.	Float
Input-*x* Alarm Deadband	Specify the deadband value. The value should be less than or equal to 0.5 times the difference between the high and low alarm values. Irrelevant if the corresponding Input x Alarm Enable = 0.	Float

Table 4.H
Field Descriptions for N-series Worksheet Continued

For this:	Do this:	Value:
±10 V Output Channel Fields		
Output *x* Data Source Selector	If the source of the output channel data is a PID function, enter a 1; if it is an alternate location, enter a 0.	Binary 0 or 1
Output *x* PID Data Block File Number	Specify the integer file number of the PID function that is the source of the output data. Irrelevant if the Output *x* Data Source Selector = 0.	Integer 125 - 998
Output *x* PID Data Block Element Number	Specify the starting element number of the data block for the PID function that is the source of the output data. Irrelevant if the Output *x* Data Source Selector = 0.	Integer 0 - 920
Output-*x* Minimum Scaling Value	Individually assign a minimum scaling value (in engineering units) to each output ($0 \le n \le 7$). This value corresponds to the minimum raw output of the module (–10V).	Float
Output-*x* Maximum Scaling Value	Individually assign a maximum scaling value (in engineering units) to each output ($0 \le n \le 7$). This value corresponds to the maximum raw output of the module (10V).	Float
Output-*x* Alarm Enable	Individually enable or disable alarms for each output ($0 \le x \le 7$). To enable alarms, enter a 1; to disable them, enter a 0.	Binary 0 or 1
Output *x* Low Clamp Value	Individually specify a low clamp value (in engineering units) for each output ($0 \le x \le 7$). The output will not fall below the value specified.	Float
Output *x* High Clamp Value	Individually specify a high clamp value (in engineering units) for each output ($0 \le x \le 7$). The output will not exceed the value specified.	Float
Output *x* Ramp Rate Limit	Individually specify a maximum ramp rate for each output ($0 \le x \le 7$). The rate of change will not exceed the value specified. The value should be between 1 and 200. Zero disables the ramp rate.	Integer 0-200%
Output *x* Reset State	Individually specify the behavior of each output when the backplane I/O reset line is asserted. Option Description 0 Remain in last state 1 Go to minimum output. 2 Go to maximum output. 3 Go to the user-specified reset value.	Integer 0-3
Output *x* Reset Value	Individually specify a reset value for each output. Irrelevant if the corresponding Output *x* Reset State ≠ 3.	Float

Table 4.H
Field Descriptions for N-series Worksheet Continued

For this:	Do this:	Value:
4-20 mA Output Channel Fields		
Output *x* Data Source Selector	If the source of output data is a PID function, enter a 1; if it is an alternate location, enter a 0.	Binary 0 or 1
Output *x* PID Data Block File Number	Specify the integer file number of the PID function that is the source of the output data. Irrelevant if the Output *x* Data Source Selector = 0.	Integer 125 - 998
Output *x* PID Data Block Element Number	Specify the starting element number of the data block for the PID function that is the source of the Output x data. Irrelevant if Output *x* Data Source Selector = 0.	Integer 0 - 920
Output-*x* Minimum Scaling Value	Individually assign a minimum scaling value (in engineering units) to each output ($0 \le n \le 7$). This value corresponds to the minimum raw output of the module (4 mA).	Float
Output-*x* Maximum Scaling Value	Individually assign a maximum scaling value (in engineering units) to each output ($0 \le n \le 7$). This value corresponds to the maximum raw input of the module (20 mA).	Float
Output-*x* Alarm Enable	Individually enable or disable alarms for each output ($0 \le x \le 7$). To enable alarms, enter a 1; to disable them, enter a 0.	Binary 0 or 1
Output *x* Low Clamp Value	Individually specify a low clamp value (in engineering units) for each output ($0 \le x \le 7$). The output will not fall below the value specified.	Float
Output *x* High Clamp Value	Individually specify a high clamp value (in engineering units) for each output ($0 \le x \le 7$). The output will not exceed the value specified.	Float
Output *x* Ramp Rate Limit	Individually specify a maximum ramp rate for each output ($0 \le x \le 7$). The rate of change will not exceed the value specified. The value should be between 1 and 200. Zero disables the ramp rate.	Integer 0 - 200%
Output *x* Reset State	Individually specify the behavior of each output when the backplane I/O reset line is asserted. Option — Description 0 — Remain in last state 1 — Go to minimum output. 2 — Go to maximum output. 3 — Go to the user-specified reset value.	Integer 0 - 3
Output *x* Reset Value	Individually specify a reset value for each output. Irrelevant if the corresponding Output *x* Reset State ≠ 3.	Float

What To Do Next

After completing the Worksheets for your Analog I/O functions:

If you:	Then go to:
need to plan your device drivers	chapter 5, Planning Device Driver Functions
are finished planning your functions and want to program your ladder logic	section 3, Programming
are finished planning your functions and want to configure your system functions	section 4, Configuring Your System

Chapter 5

Planning Device Driver Functions

Chapter Objectives

Read this chapter to learn how to assign device driver functions by using the worksheets we provide in appendix B.

Prerequisites

To complete the device driver worksheets, you need:

- a schematic drawing of your process control system
- a bill of materials giving detailed information about the devices, loops, and miscellaneous hardware elements in the system that you will connect to I/O modules
- an understanding of the PLC-5 processor I/O addressing scheme
- a supply of blank worksheets made from those in appendix B
- If you will be using the PCO PanelView function, reserve I/O racks 6 and 7 for use by the PanelView terminal.

ATTENTION: If you will be using PCO PanelView functions, read the important notice on page 15-2.

Completing Worksheets for Two-State Devices

To plan your requirements for two-state devices, use worksheet 5.1, Two-State Device-Driver (DD2) Assignments. See appendix B for blank copies. Figure 5.1 shows a sample page of a completed two-state device-driver assignment worksheet. Table 5.A explains each line on the worksheet. To use worksheet 5.1, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.
2. Use as many worksheets as necessary to document all of the two-state devices in the system.
3. Fill in the information requested for each two-state device.

Figure 5.1
Sample of Completed DD2 Worksheet

PCO Worksheet 5.1
DD2 Assignments

Date 8/6/92
Page 1 of 1

Device Name	VALVE_43			
Integer Data Block Address	N200:0			
Description	WATER SPRAY VALVE			
Device Enabled (1=Yes/0=No)	1			
FB0 Enabled (1=Yes/0=No)	1			
FB1 Enabled (1=Yes/0=No)	1			
FB0 State When On (1=On/0=Off)	1			
FB0 State When Off (1=On/0=Off)	0			
FB1 State When On (1=On/0=Off)	0			
FB1 State When Off (1=On/0=Off)	1			
Manual And Off On Fault (1=Yes/0=No)	0			
Override State (1=On/0=Off)	0			
Output Reversal (1=Yes/0=No)	0			
Output Rack Number[1]	17			
Output Group Number (0-7)	5			
Output Channel Number (0-15)	9			
FB0 Rack Number[1]	3			
FB0 Group Number (0-7)	0			
FB0 Channel Number (0-15)	0			
FB1 Rack Number [1]	3			
FB1 Group Number (0-7)	0			
FB1 Channel Number (0-15)	1			
Fault Time (0-327 seconds)	10			

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Table 5.A
Field Descriptions for DD2 Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Device Name	Assign a unique name to every two-state device. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Description	Describe the function of every two-state device. The description can contain a maximum of 32 characters (letters and/or numbers).	
Device Enabled	Enable or disable each two-state device. To enable the device, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
FB0 Enabled	Enable or disable feedback circuit FB0. To enable FB0, enter a 1; to disable it, enter a 0.	Binary 0 or 1
FB1 Enabled	Enable or disable feedback circuit FB1. To enable FB1, enter a 1; to disable it, enter a 0.	Binary 0 or 1
FB0 State When On	If the FB0 feedback circuit is active when the device is in the On state, enter a 1; otherwise, enter a 0. Irrelevant if FB0 Enabled = 0.	Binary 0 or 1
FB0 State When Off	If the FB0 feedback circuit is active when the device is in the Off state, enter a 1; otherwise, enter a 0. Irrelevant if FB0 Enabled = 0.	Binary 0 or 1
FB1 State When On	If the FB1 feedback circuit is active when the device is in the On state, enter a 1; otherwise, enter a 0. Irrelevant if FB1 Enabled = 0.	Binary 0 or 1
FB1 State When Off	If the FB1 feedback circuit is active when the device is in the Off state, enter a 1; otherwise, enter a 0. Irrelevant if FB1 Enabled = 0.	Binary 0 or 1
Manual and Off on Fault	If you want the device to go to manual mode and shut off following a fault alarm, enter a 1; otherwise, enter a 0.	Binary 0 or 1
Override State	If you want the device to go to the On state when override is enabled, enter a 1; if you want the device to go to the Off state, enter a 0.	Binary 0 or 1
Output Reversal	If you want the device to shut off when the output circuit supplies power to it, enter a 1; otherwise, enter a 0. In effect, this lets you invert the output.	Binary 0 or 1
Output Rack Number	Assign a rack number to the module used for the output.	Integer 0 - 27[1] (octal)
Output Group Number	Assign a group number to the module used for the output.	Integer 0 - 7
Output Channel Number	Assign a channel number to the module used for the output.	Integer 0 - 15
FB0 Rack Number	Assign a rack number to the module used for input FB0.	Integer 0 - 27[1] (octal)
FB0 Group Number	Assign a group number to the module used for input FB0.	Integer 0 - 7
FB0 Channel Number	Assign a channel number to the module used for input FB0.	Integer 0 - 15
FB1 Rack Number	Assign a rack number to the module used for input FB1.	Integer 0 - 27[1] (octal)
FB1 Group Number	Assign a group number to the module used for input FB1.	Integer 0 - 7
FB1 Channel Number	Assign a channel number to the module used for input FB1.	Integer 0 - 15
Fault Time	Specify a time (in seconds) to wait for the device to reach the commanded state before triggering a fault alarm.	Integer 0 - 327

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Completing Worksheets for Three-State Devices

To plan your requirements for three-state devices, use worksheet 5.2, Three-State Device-Driver (DD3) Assignments. See appendix B for blank copies. Figure 5.2 shows a sample page of a completed three-state device-driver assignment worksheet. Table 5.B explains each line on the worksheet. To use worksheet 5.2, do the following:

1. Make several photocopies of the worksheet. Do not write on the original.
2. Use as many worksheets as necessary to document all of the three-state devices in the system.
3. Fill in the information requested for each three-state device.

Figure 5.2
Sample of Completed DD3 Worksheet

PCO Worksheet 5.2
DD3 Assignments

Date *8/6/92*
Page *1 of 2*

Device Name	*A_FEED*			
Integer Data Block Address	*N201:0*			
Description	*INGREDIENT A FEEDER SYSTEM*			
Device Enabled (1=Yes/0=No)	*1*			
FB0 Enabled (1=Yes/0=No)	*1*			
FB1 Enabled (1=Yes/0=No)	*1*			
FB2 Enabled (1=Yes/0=No)	*1*			
FB3 Enabled (1=Yes/0=No)	*1*			
Output-0 Rack Number[1]	*7*			
Output-0 Group Number (0-7)	*7*			
Output-0 Channel Number (0-15)	*0*			
Output-0 State When On (1=On/0=Off)	*1*			
Output-0 State When Mid (1=On/0=Off)	*0*			
Output-0 State When Off (1=On/0=Off)	*0*			
Output-1 Rack Number[1]	*7*			
Output-1 Group Number (0-7)	*7*			
Output-1 Channel Number (0-15)	*1*			
Output-1 State When On (1=On/0=Off)	*1*			
Output-1 State When Mid (1=On/0=Off)	*1*			
Output-1 State When Off (1=On/0=Off)	*0*			
Override State (2=On/1=Mid/0=Off)	*0*			
Manual and Off on Fault (1=Yes/0=No)	*0*			
Fault Time (0-327 seconds)	*5*			
FB0 Rack Number[1]	*7*			
FB0 Group Number (0-7)	*6*			
FB0 Channel Number (0-15)	*0*			
FB0 State When On (1=On/0=Off)	*1*			
FB0 State When Mid (1=On/0=Off)	*0*			
FB0 State When Off (1=On/0=Off)	*0*			
FB1 Rack Number[1]	*7*			
FB1 Group Number (0-7)	*6*			
FB1 Channel Number (0-15)	*1*			
FB1 State When On (1=On/0=Off)	*0*			
FB1 State When Mid (1=On/0=Off)	*1*			
FB1 State When Off (1=On/0=Off)	*1*			
FB2 Rack Number[1]	*7*			
FB2 Group Number (0-7)	*6*			
FB2 Channel Number (0-15)	*2*			
FB2 State When On (1=On/0=Off)	*1*			
FB2 State When Mid (1=On/0=Off)	*1*			

PCO Worksheet 5.2
DD3 Assignments Continued

Date 8/6/92
Page 2 of 2

FB2 State When Off (1=On/0=Off)	0			
FB3 Rack Number[1]	7			
FB3 Group Number (0-7)	6			
FB3 Channel Number (0-15)	3			
FB3 State When On (1=On/0=Off)	0			
FB3 State When Mid (1=On/0=Off)	0			
FB3 State When Off (1=On/0=Off)	1			
[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.				

Table 5.B
Field Descriptions for DD3 Worksheet

Important: When a field says "irrelevent if xx is true," the value in that field will not be used if "xx" is true, but the field must still contain a valid entry, according to the conditions listed.

For this field:	Do this:	Value:
Device Name	Assign a unique name to every three-state device. The name can have a maximum of nine characters (letters and/or numbers).	
Integer Data Block Address	Assign an address for the integer data block.	
Description	Describe the function of every three-state device. The description can contain a maximum of 32 characters (letters and/or numbers).	
Device Enabled	Enable or disable each three-state device. To enable the device, enter a 1; to disable it, enter a 0. When disabled, configuration alarms are still checked but no control is performed.	Binary 0 or 1
FB0 Enabled	Enable or disable feedback circuit FB0. To enable FB0, enter a 1; to disable it, enter a 0.	Binary 0 or 1
FB1 Enabled	Enable or disable feedback circuit FB1. To enable FB1, enter a 1; to disable it, enter a 0.	Binary 0 or 1
FB2 Enabled	Enable or disable feedback circuit FB2. To enable FB2, enter a 1; to disable it, enter a 0.	Binary 0 or 1
FB3 Enabled	Enable or disable feedback circuit FB3. To enable FB3, enter a 1; to disable it, enter a 0.	Binary 0 or 1
Output-*n* Rack Number	Individually assign a rack number to each output ($0 \le n \le 1$).	Integer 0 - 27[1] (octal)
Output-*n* Group Number	Individually assign a group number to each output ($0 \le n \le 1$).	Integer 0 - 7
Output-*n* Channel Number	Individually assign a channel number to each output ($0 \le n \le 1$).	Integer 0 - 15
Output-*n* State When On	Individually specify the state of each output ($0 \le n \le 1$) when the device is commanded on. For the On state, enter a 1; for Off, enter a 0.	Binary 0 or 1
Output-*n* State When Mid	Individually specify the state of each output ($0 \le n \le 1$) when the device is commanded mid. For the On state, enter a 1; for Off, enter a 0.	Binary 0 or 1
Output-*n* State When Off	Individually specify the state of each output ($0 \le n \le 1$) when the device is commanded off. For the On state, enter a 1; for Off, enter a 0.	Binary 0 or 1

Table 5.B
Field Descriptions for DD3 Worksheet Continued

For this field:	Do this:	Value:
Override State	If you want the device to go to the Off state when override is enabled, enter a 0; if to Mid, enter a 1; if to On, enter a 2.	Integer 0 - 2
Manual and Off on Fault	If you want the device to go to manual mode and shut off following a fault alarm, enter a 1; otherwise, enter a 0.	Binary 0 and 1
Fault Time	Specify a time (in seconds) to wait for the device to reach the commanded state before triggering a fault alarm.	Integer 0 - 327
FB*n* Rack Number	Individually assign a rack number to the module used for each feedback input ($0 \leq n \leq 3$). Irrelevant if corresponding FB*n* Enabled = 0.	Integer 0 - 27[1] (octal)
FB*n* Group Number	Individually assign a group number to the module used for each feedback input ($0 \leq n \leq 3$). Irrelevant if corresponding FB*n* Enabled = 0.	Integer 0 - 7
FB*n* Channel Number	Individually assign a channel number to the module used for each input ($0 \leq n \leq 3$). Irrelevant if corresponding FB*n* Enabled = 0.	Integer 0 - 15
FB*n* State When On	If FB*n* is active when the device is in the On state, enter a 1; otherwise, enter a 0. Irrelevant if corresponding FB*n* Enabled = 0.	Binary 0 or 1
FB*n* State When Mid	If FB*n* is active when the device is in the Mid state, enter a 1; otherwise, enter a 0. Irrelevant if corresponding FB*n* Enabled = 0.	Binary 0 or 1
FB*n* State When Off	If FB*n* is active when the device is in the Off state, enter a 1; otherwise, enter a 0. Irrelevant if corresponding FB*n* Enabled = 0.	Binary 0 or 1

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

t To Do Next

After completing the Worksheets for your device driver functions:

If you:	Then go to:
are finished planning your functions and want to program your ladder logic	section 3, Programming
are finished planning your functions and want to configure your system functions	section 4, Configuring Your System

Section 3

Programming Your System

Preparing for Programming– **Chapter 6**

Interfacing with PCO Device-Driver Logic – **Chapter 7**

Interfacing with PCO Loop Logic – **Chapter 8**

Programming the Ladder Logic – **Chapter 9**

Read Chapter 6 to get an overview of the PCO system programming environment as well as information you need before you start programming.

Chapters 7 and 8 have more in-depth information about the guidelines for interfacing user-generated, ladder-logic programs to PCO device driver functions.

After you are familiar with the information described above, read Chapter 9 to step you through the actual programming of your ladder-logic.

Chapter 6

Preparing for Programming

Chapter Objectives

Read this chapter for an overview of the:

- PCO system programming environment
- PCO ladder logic provided for you
- general guidelines you should be aware of before you get started with program development
- materials you need to have to write your ladder logic

If after reading this chapter, you need more programming details regarding the PID loops and device drivers, read chapters 7 and 8.

What You Need to Know

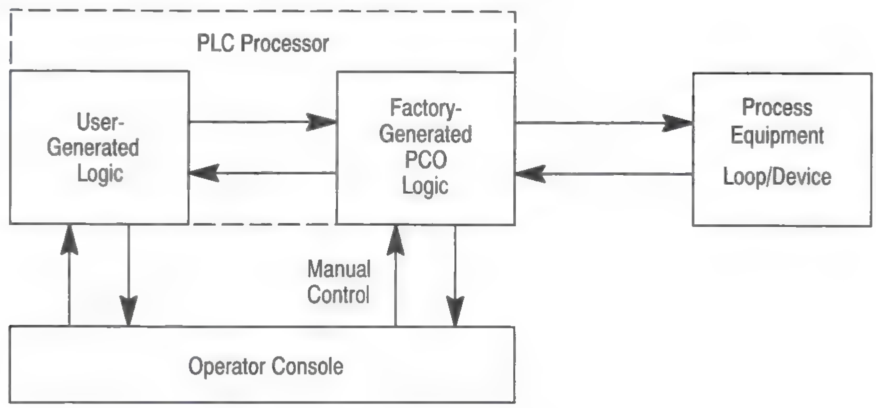
To write ladder logic, you need to have:

- a working knowledge of PLC-5 ladder-logic programming and 6200-Series programming software
- experience with IBM® AT™ computers and PC-DOS

PCO Logic for Loops/ Analog I/O/Devices

PCO software includes ladder logic for PID loops, analog I/O, and discrete devices. This PCO ladder logic provides consistent interfacing with and control of process-control loops and devices. The ControlView software does not restrict you from writing your own ladder logic for interfacing directly with PID loops, analog I/O, and discrete devices if you wish to do so.

Figure 6.1
Interfacing with Loop/Device Process Equipment



The PCO logic directly controls the state of your process equipment and handles the handshaking logic between the process equipment and the ladder logic you generate. This handshaking logic includes such functions as alarming on failure of a device to go to its commanded state and manual intervention from the operator console.

PCO logic is provided for two-state and three-state digital devices, PID loops, and analog I/O. By using this logic, you eliminate any need to generate any ladder logic for manual control, and you can significantly reduce and simplify the ladder logic that you must generate to provide supervisory control from the operator console.

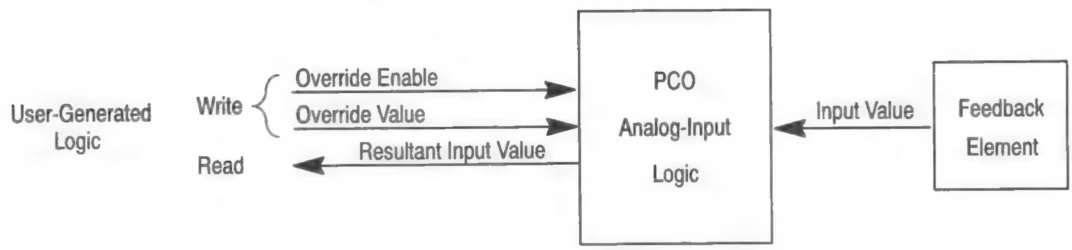
PCO Logic for Analog Input Overrides

In addition to performing all of the necessary block transfers, etc., the analog input functions provide logic to allow you to override the value of any analog input.

The PCO logic for analog inputs compares the input value from each analog input circuit to its corresponding override enable and override value from your ladder logic, and makes the result of this comparison available in the data table as the resultant input value.

To use the functions programmed into the PCO logic, the ladder logic you generate for each operation must read values that the PCO input logic controls and control values that the PCO input logic reads. Figure 6.2 is a block diagram showing the input and output values for PCO analog-input logic.

Figure 6.2
PCO Logic for Analog Inputs



If the override-enable bit is off, the resultant input value comes directly from the input value of the input circuit.

If the override-enable bit is on, the resultant input value comes from the override value.

You need the following information to generate your ladder logic to interface with the PCO logic for analog inputs:

- PCO worksheets 4.1 through 4.8 (from chapter 4) showing the data block address for each module. See appendix C for the address of each value your logic must read from and write to for interfacing with the PCO logic for analog inputs.
- Table 6.A which describes the functions available to you for programming analog inputs, what your ladder logic must do to which bits and words to do these functions, and any special conditions relating to these functions.

Table 6.A
PCO Logic Functions for Analog Inputs

To perform this function:	Your ladder logic must do this:	Exceptions/conditions:
Override the resultant input value.	Write the override value you want to the override-value word. Turn on the override-enable bit.	The resultant input value becomes that of the override value, regardless of the input value.
Remove the override.	Turn off the override-enable bit.	The resultant input value becomes that of the input value.
Determine the actual input value directly from the feedback element.	Examine the actual input-value word.	
Determine the input value that **can** be overridden.	Examine the resultant-input-value word.	

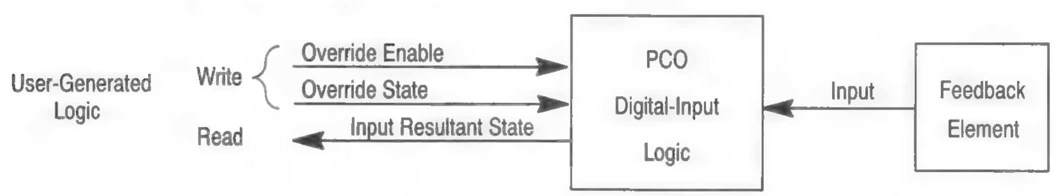
PCO Logic for Digital Overrides

PCO logic for digital inputs is provided to allow you to override the value of any possible digital input.

The PCO logic for digital inputs compares the input signal on each digital input circuit to its corresponding override enable signal and override state signal from your ladder logic, and makes the result of this comparison available in the data table as the input state.

To use the functions programmed into the PCO logic, the ladder logic you generate for each operation must read bits that the PCO input logic controls and control bits that the PCO input logic reads. Figure 6.3 is a block diagram showing the input and output bits for PCO digital-input logic.

Figure 6.3
PCO Logic for Digital Inputs



If the override-enable bit is off, the input state comes directly from the state of the input circuit.

If the override-enable bit is on, the input state comes from the override state.

The PCO logic for digital inputs uses the following data table files with which your logic should interface:

- N18 = Override Enable bits
- N19 = Override State bits
- N20 = Digital Input Result bits

For example, the digital input result bit for I:167/10 would be N20:167/8. Note that the bit numbers must be referenced in decimal.

Table 6.A describes the functions available to you for programming for digital inputs, what your ladder logic must do to which bits to do these functions, and any special conditions relating to these functions.

Table 6.A
PCO Logic Functions for Digital Inputs

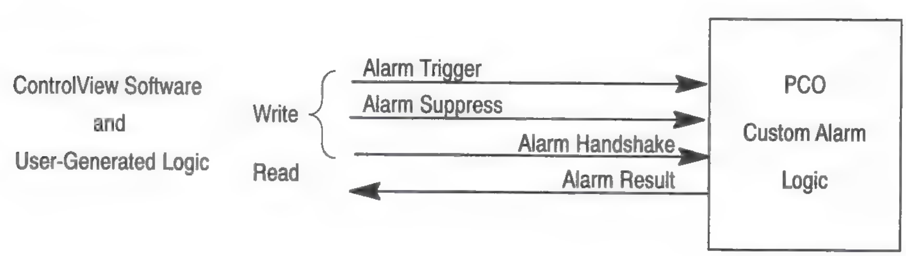
To perform this function:	Your ladder logic must do this:	Exceptions/conditions:
Override the input state to **1**.	Turn on the override-state bit (N19). Turn on the override-enable bit (N18).	Input state is **1** regardless of the input signal.
Override the input state to **0**.	Turn off the override-state bit (N19). Turn on the override-enable bit (N18).	Input state is **0** regardless of the input signal.
Remove the override.	Turn off the override-enable bit (N18).	Input state follows the input signal.
Determine the actual input state directly from the feedback element.	Examine the input bit.	On = Input is closed.
Determine the state of the input signal.	Examine the input-resultant-state bit (N20).	On = Input is closed, unless overridden by your logic.

PCO Logic for Custom Alarms

The PCO logic for custom alarms allows the ladder logic you generate to trigger alarms based on events that you decide are critical. Your ladder logic can also suppress any custom alarm. Each PLC processor provides PCO logic for 256 custom alarms.

To use the custom alarms programmed into the PCO logic, the ladder logic you generate for each operation must read bits that the PCO logic controls, and control bits that the PCO logic reads. Figure 6.4 is a block diagram showing the input and output bits for this PCO logic.

Figure 6.4
PCO Logic for Custom Alarms



When the alarm suppress bit is on, the alarm result bits are held off continuously (both with and without handshaking). When the alarm suppress bit is off, turning on the alarm trigger bit for a minimum of one program scan triggers the alarm, thereby turning on the alarm result bits.

If you created an alarm result tag in ControlView, the state of the alarm result bit is read by ControlView. If you are using handshaking, when ControlView reads a signal indicating an alarm condition, it sends back a signal to turn on the alarm handshake bit. When the alarm trigger bit is off, the alarm handshake bit being on turns off the alarm result bit. ControlView keeps the alarm handshake bit on until it detects that the alarm result with handshaking bit is off. At that point, control of the alarm handshake bit depends on whether auto reset has been selected with ControlView.

Note that if you wish to monitor a custom alarm with ControlView, but do not wish to use handshaking, your custom alarm tag should reference the custom-alarm-result-without-handshaking bit.

If auto reset was:	Then:
selected (normal)	ControlView detects that the alarm result bit is off, it turns off the alarm handshake bit. In this case, the ladder logic you generate must not try to control the alarm handshake bit.
not selected (rare)	ControlView detects that the alarm result bit is off, it stops controlling the alarm handshake bit. In this case, the ladder logic you generate must turn off the alarm handshake bit so that the next alarm can be detected.

The PCO logic for custom alarms uses the following data table files with which your logic should interface:

- N33 = Alarm Trigger bits
- N34 = Alarm Suppression bits
- N35 = Alarm Handshake bits
- N36 = Alarm Result without Handshaking bits
- N37 = Alarm Result with Handshaking bits

Each of these files is 16 words long. For example, to trigger the 256th custom alarm bit, your logic must turn on bit N33:15/15.

You must create any custom alarm result and custom alarm handshaking tags in ControlView as you desire.

Table 6.B describes the functions available to you for programming for custom alarms, what your ladder logic must do to which bits to do these functions, and any special conditions relating to these functions.

Table 6.B
PCO Logic Functions for Custom Alarms

To perform this function:	Your ladder logic must do this:	Exceptions/conditions:
Trigger the alarm.	Turn on the alarm trigger bit. Turn off the alarm suppress bit.	The alarm result bits (both with and without handshaking) are held on until the alarm trigger is off and the operator console turns on the alarm handshake bit.
Suppress the alarm.	Turn on the alarm suppress bit.	The alarm result bits stay off regardless of the alarm trigger bit.
Monitor the alarm condition without using handshaking.	Examine the alarm result without handshaking bit.	On = alarm trigger is on.
Monitor the alarm condition using handshaking.	Examine the alarm result with handshaking bit.	On = alarm trigger is on or the alarm handshake signal from ControlView for a previous alarm has not yet been received.
Monitor the alarm handshake signal from ControlView.	Examine the alarm handshake bit.	On = console has detected that the alarm has been triggered.

Pre-Engineered Alarms for PLC Status

Miscellaneous PLC status alarms are available in the pre-engineered logic supplied with the PCO option.

PLC Status Alarms

The PLC status alarms are:

- A battery low alarm to indicate that the PLC's battery is weak and should be replaced.
- A rack fault alarm to indicate that the PLC processor has lost communication with a specific I/O rack.

Writing Your Ladder Logic

Your ladder logic will generally consist of Jump-to-Subroutine (JSR) instructions which call the various PCO functions you are using. In addition, you will, typically, program interlock logic, and sequencing logic.

General Programming Guidelines

Your ladder logic may use any valid PLC-5 instructions. There are certain restrictions:

- Store your main program in program file 55, and any subroutines in program files 56 to 999. Program file 55 is your main program file, which is executed every program scan. PCO logic uses files 0 through 54.
- You may generate any data-table files you need for your program. However, they must be placed in data files 125 to 999. Data-table files 0 through 124 are reserved by PCO logic. If you are also using the Batch Management option (6190-BAT), do not use 125 through 349; these are used by the Batch Management option.
- Do not modify program files 0 through 54; they are included with the PCO. Such modifications are not supported by Allen-Bradley.
- Seven levels of subroutine calls are allowed in a PLC-5 processor. Your program file 55 uses one level. Therefore, you can have only 6 additional levels of subroutine calls from program file 55. You can store your subroutines in program files 56 to 999 only.
- You may use any file from 56 to 999 as an STI (selectable-timed-interrupt) file, if you desire.

Other restrictions are given in the sections to which they apply.

STI/Non-STI Considerations

When implementing an analog I/O or PID function, you specify, on the corresponding configuration screen, whether the function is implemented in an STI (selectable timed interrupt) or non-STI manner. STI routines execute at a fixed time interval (the STI rate) regardless of the scan time. Non-STI routines run once every program scan. If you specify STI, the JSR for that function must reside in a PLC-5 program file configured as the STI file (on the 6200-series processor configuration screen) or in a file called from the STI file. If you specify non-STI, the JSR must reside in a program file not executed from the STI file. (Refer to "Programming JSR Instructions" in chapter 7 for details.)

You should consider several points before choosing to implement a function in either an STI or non-STI manner. When executing any analog I/O function in an STI manner, the corresponding analog I/O module **must** reside in either a resident local or extended local I/O chassis, because of the unpredictable nature of remote I/O block transfer timing. Any analog I/O function executed in an STI manner **must** have its RTS (real time sample) rate set to zero to disable RTS in the module. If RTS is not disabled, the function will return block transfer timeouts because the module only responds to block transfer read requests once per RTS period.

STI Considerations
PID loops executed in an STI manner:

- must have the corresponding control variable and process variable analog I/O functions execute in an STI manner.

- automatically use the STI update time as the loop update time.

You enter the STI update time on the 6200-series processor configuration screen. Any OFE functions used for the control variable of a PID loop must have the BTR (block transfer read) mode set to "on demand". If BTR mode is set to "continuous", the OFE module will only obtain BTW (block transfer write) data every other STI execution.

Non-STI Considerations
PID loops executed in a non-STI manner:

- must have the corresponding analog I/O functions for the process variable and control variable executed in a non-STI manner.

- automatically use, as the loop update time, the RTS period configured for the module from which the process variable is obtained.

Analog I/O functions executed in a non-STI manner

- may reside in either local or remote I/O chassis.

  Therefore, you should configure a valid, non-zero RTS time for any analog I/O functions used as process variable sources for PID loops. Set the RTS time greater than the worst case block transfer time plus two program scans; this allows for cycling of the BTR instruction.

  An RTS timeout alarm will occur if the RTS time is not long enough. This indicates that the PLC processor cannot request a BTR quickly enough to read every real time sample.

Although possible, we do not recommend executing two- or three-state device driver functions in an STI. These two functions do not require the precise update rate provided by the STI.

In general, use local I/O with functions executed in an STI manner for PID loops requiring relatively quick (≤500 millisecond) updates, for example, flow loops, pressure loops, etc. Use remote I/O with functions executed in a non-STI manner for large numbers of loops requiring slower (1-2 second) updates, for example, temperature loops.

Important: Every I/O module should be accessed by no more than one PCO Analog I/O function. For example, do not configure two IFE functions functions to use the same 1771-IFE module.

Important: Do not configure both an STI and a Non-STI version of a function to use the same I/O module.

Programming Guidelines When Using the Batch Management Option (6190-BAT)

If you are using PCO in conjunction with the Batch Management option (6190-BAT), you must create the data table files in the PLC processor from 125 through 349, required by the Batch Management option for the unit tables. Refer to the Batch Management Option User Manual for a listing of the required data table files and their size.

What To Do Next

Once you have read the programming overview information in this chapter:

You can:	Go to:
read more about the loop logic	chapter 7, "Interfacing with PCO Loop Logic."
read more about the device driver logic	chapter 8, "Interfacing with PCO Device-Driver Logic."
program your ladder logic	chapter 9, "Program Your Ladder Logic."

Chapter 7

Interfacing with PCO Loop Logic

Chapter Objectives

You interface regulatory loops to user-generated ladder-logic programs by using PCO loop logic.

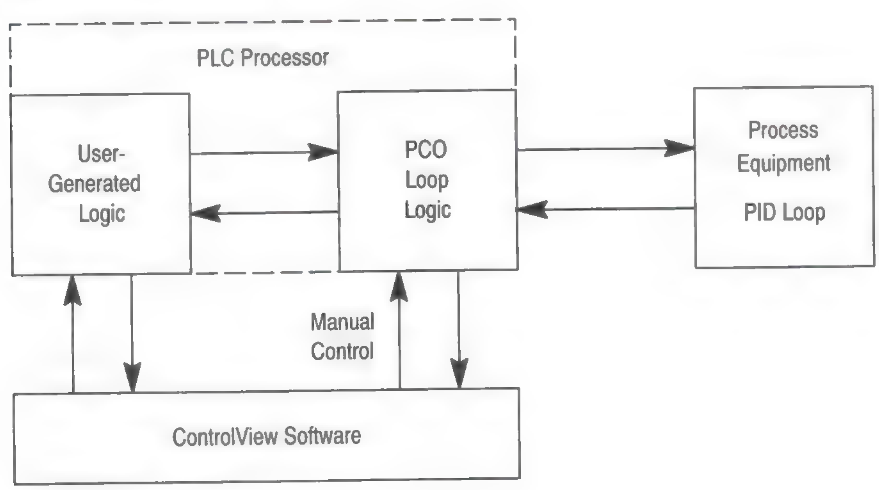
This chapter describes:

- PCO loop logic
- I/O assignments for PID loops
- control of PID loop mode selections

Introduction to PCO Loop Logic

The PCO ladder logic provides a PID control algorithm and provides convenient communication with process equipment for a control loop by handling all of the handshaking (including alarms) with the loop elements.

Figure 7.1
Interface for a PID Loop



Advantages

The advantages of using the logic we provide are:

- You can control loops without generating any rungs. The PCO logic for loops provides the operator with non-supervisory control of the loops (including alarm and status information).
- The PCO logic for loops also reads from and writes to the data table. Therefore, the logic you generate does not need to handle direct communication with the loop process equipment. This simplifies the rungs you generate and reduces their size.
- The PCO logic for loops allows your ladder logic to communicate with and control process equipment in a consistent manner.

Control through ControlView Software

Some functions of the PCO loop logic are controllable through the ControlView software as well as through the user-generated logic. This control is described in chapter 16, "Monitoring PID Loops".

Worksheets Required

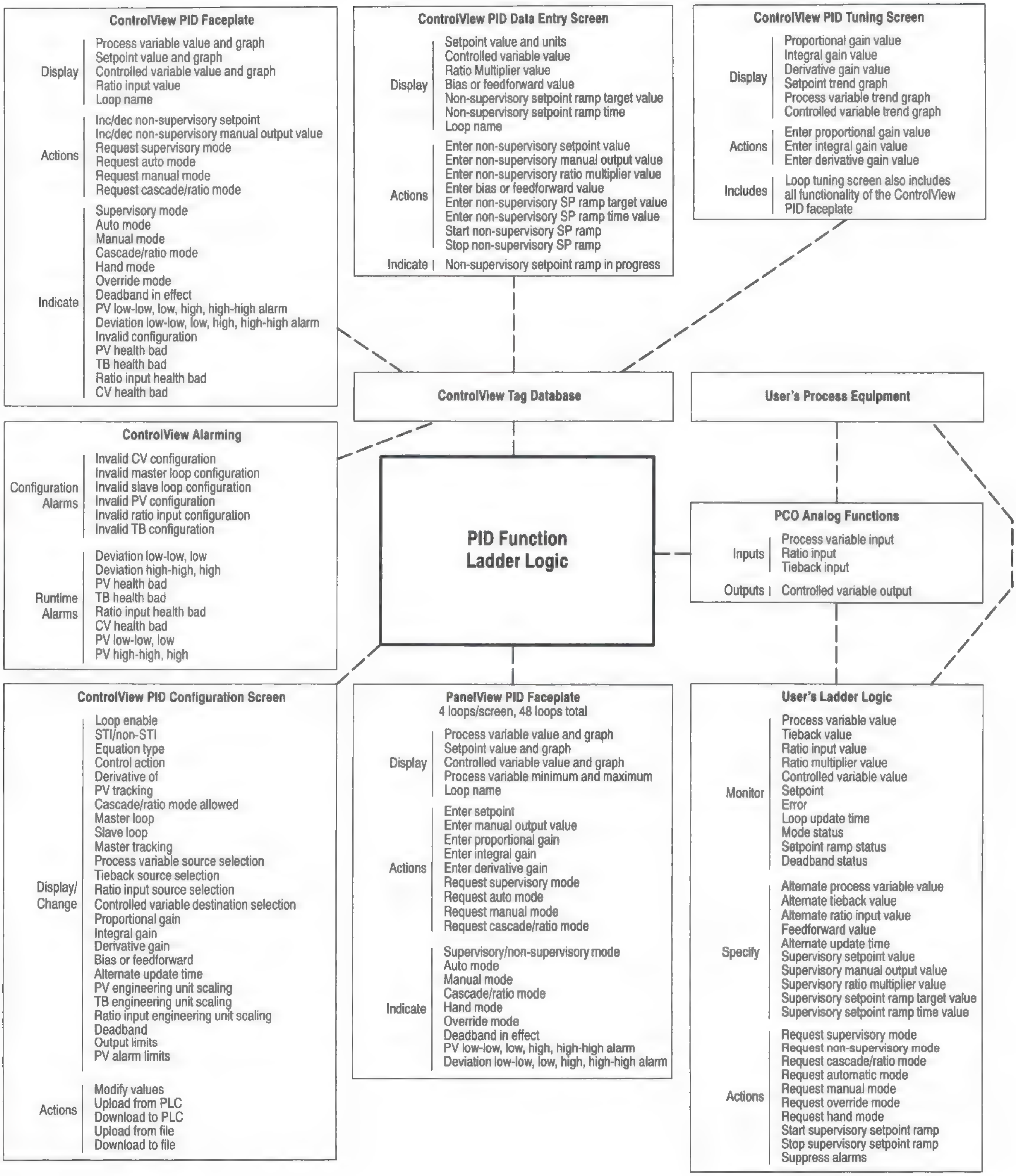
You need the following information to generate your ladder logic to interface with PCO logic for a loop and its assigned analog inputs for feedback circuits:

Worksheets 3.1 (from chapter 3). These worksheets contain the data block addresses. See appendix C for addresses of the bits and words your logic must read from and write to for interfacing with PCO loop logic.

Inputs and Outputs of PCO Loop Logic

To use the pre-programmed PCO functions, the ladder logic you generate for each operation must read bits that the PCO logic controls, and must control bits that the PCO logic reads. Figure 7.2 is a block diagram showing the input and outputs for this PCO logic.

Figure 7.2
PCO Logic for PID Control Loops Showing Inputs and Outputs



Controlling Loop Mode Selection from Your Ladder Logic

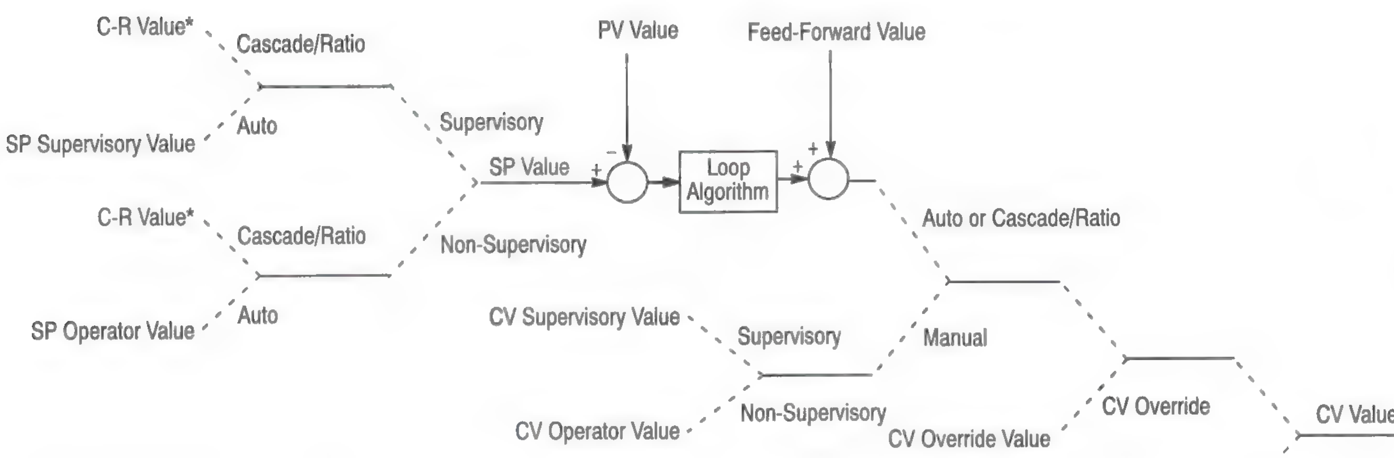
The ladder logic you generate can control the loop mode of operation by enabling or disabling the following selections:

- Supervisory
- Cascade/Ratio
- Auto
- Manual
- CV Override
- Hand

These selections are inter-related as shown in Figure 7.3.

The following section describes how the ladder-logic controls these values.

Figure 7.3
Interrelationship of Loop Mode Selections and Values



* Note that the Cascade/Ratio value will either equal the output of a master loop (if this loop is a slave loop of a cascaded pair), or the Cascade/Ratio value will equal the product of the ratio input times the ratio multiplier.

The bits in word 21 of the Integer Data block are the mode requests from the PLC processor. These bits are set by your PLC logic to change the mode of the loop. The following table describes each bit.

Bit:	Function:
0	is the supervisory request from the PLC processor You can set this bit in your PLC logic to put the loop in supervisory mode. When you turn off this bit, the loop will still remain in supervisory mode until requested to go to non-supervisory by your ladder logic setting the non-supervisory request from PLC bit or by the operator requesting a mode change from the faceplate on ControlView. If you leave this bit always set on, the loop cannot go to non-supervisory mode unless the non-supervisory request from the PLC processor is also on.
1	is the non-supervisory request from the PLC processor. You can set this bit in your PLC logic to put the loop in non-supervisory mode. When you turn off this bit, the loop will still remain in non-supervisory mode until requested to go to supervisory. If you leave this bit always set on, the loop cannot go to supervisory mode. The non-supervisory request from PLC bit will override the supervisory request from PLC bit.
2	is the cascade/ratio request from the PLC processor. If the loop is in supervisory mode, you can set this bit in your PLC logic to put the loop in cascade/ratio mode. When you turn off this bit, the loop will still remain in cascade/ratio mode until requested to go to some other mode. If you leave this bit always set on, the loop cannot go to any other mode (although a configuration alarm or loss of PV or CV health will always cause the loop to go to manual mode, and a loss of ratio input health will cause a ratio loop in cascade ratio mode to go to auto).
3	is the auto request from the PLC processor. If the loop is in supervisory mode, you can set this bit in your PLC logic to put the loop in auto mode. When you turn off this bit, the loop will still remain in auto mode until requested to go into some other mode. If you leave this bit always set on, the loop cannot go to any other mode (although a configuration alarm or loss of PV or CV health will always cause the loop to go to manual mode). Note that an auto request from the PLC processor will override a cascade/ratio request from the PLC processor.
4	is the manual request from the PLC processor. If the loop is in supervisory mode, you can set this bit in your PLC logic to put the loop in manual mode. When you turn off this bit, the loop will still remain in manual mode until requested to go to some other mode. If you leave this bit always set on, the loop cannot go to another mode (except for override or hand modes). Note that an manual request from the PLC processor will override a cascade/ratio request from the PLC processor.
5	is the override request from the PLC processor. You can set this bit in your PLC logic to put the loop in override mode. When you turn off this bit, the loop will go to manual mode until requested to go to some other mode. If you leave this bit always set on, the loop cannot go to another mode (except for hand mode). Note that an override request from the PLC processor will override a cascade/ratio, auto, or manual request from the PLC processor or ControlView.

Bit:	Function:
6	is the hand request from the PLC processor. You can set this bit in your PLC logic to put the loop in hand mode. When you turn off this bit, the loop will go to manual mode until requested to go to some other mode. If you leave this bit always set on, the loop cannot go to another mode. Note that a hand request from the PLC processor will override a cascade/ratio, auto, manual, or override request from the PLC processor or ControlView.
8	is the supervisory SP ramp on request. You can set this bit in your PLC logic to start a ramp of the supervisory SP.
9	is the supervisory SP ramp off request. You can set this bit in your PLC logic to stop a ramp of the supervisory SP. The ramp off request will override the ramp on request.

What To Do Next

After reading this chapter:

You can:	Go to:
read about the device driver logic	chapter 8, "Interfacing with PCO Device-Driver Logic."
program your ladder logic	chapter 9, "Program Your Ladder Logic."

Chapter 8

Interfacing with PCO Device-Driver Logic

Chapter Objectives

You interface two-state and three-state devices to user-generated ladder-logic programs by using PCO device-driver logic.

This chapter describes:

- PCO device-driver logic
- I/O assignments for device drivers
- device driver inputs and outputs
- coordination with ControlView

Introduction to PCO Device-Driver Logic

The factory-provided ladder logic for two-state and three-state devices provides convenient communication with a process device by handling the handshaking (including alarms) between each device and ControlView.

Figure 8.1 shows the relationship between a two-state device and the rest of the system.

Figure 8.1
Interface for a Two-State Device

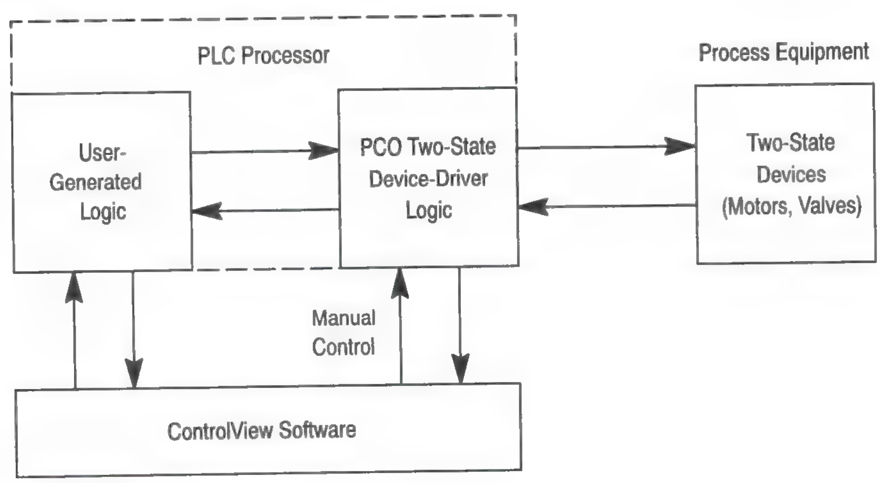
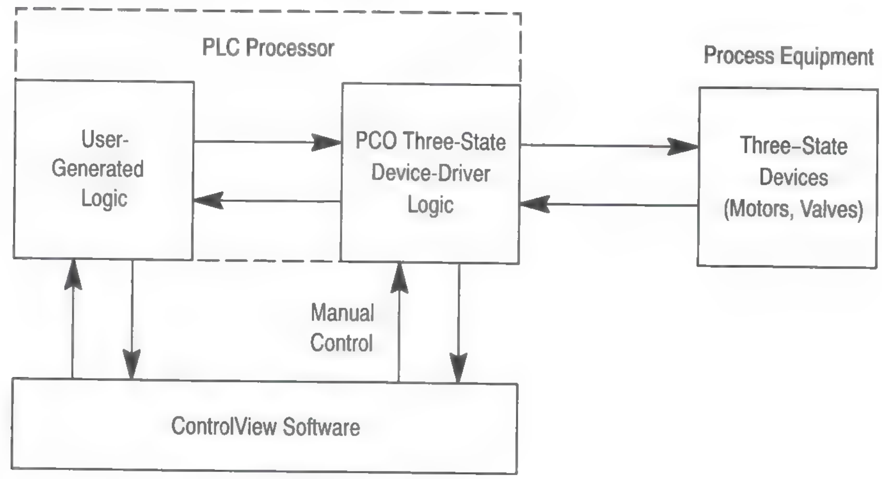


Figure 8.2 shows the relationship between a three-state device and the rest of the system.

Figure 8.2
Interface For a Three-State Device



PCO Device-Driver Advantages

The advantages of using the logic we provide are:

- You can control devices manually (including alarm and status information) without generating any additional ladder-logic programming.
- The device-driver logic reads from and writes to the data table; therefore, user-generated ladder programs do not have to handle direct communication with devices. This simplifies your ladder program by reducing its size.
- Your ladder program communicates with and controls devices in a consistent manner.

The device-driver logic is programmed to perform many functions. You should use the driver logic to control the process devices in your system so that the ladder logic you generate can take advantage of these functions. The following table lists some of these functions and their advantages to you.

Table 8.A
Advantages of Using PCO Functions

Function:	Advantage:
Indicate state of devices	Allows you to use the device-on and device-off signals as conditions for further processing.
Override the commanded state of the device	Allows you to override the device to a known state for special situations.
Select the driver mode	Allows you to manage the control of the devices through either the ladder logic you generate (supervisory mode) or the operator (manual mode).
Indicate driver mode status	Allows both your ladder logic and the operator to know the driver mode status.
Generate alarms	Allows your ladder logic to respond to an alarm state for a device.
Suppress alarms	Allows your ladder logic to suppress sending alarm signals to ControlView.

Control Through ControlView

Some functions in the driver logic are controllable through the ControlView software as well as through the user-generated logic. This is described in chapter 18, "Monitoring Devices".

Later in this chapter, in a section labeled "Co-ordinating with Signals" from the ControlView software, we explain how your ladder logic must be organized to allow signals from the ControlView software to have the effect that you intend.

I/O Assignments for Device Drivers

In chapter 5, on the PCO worksheets for device drivers you:

- assigned a digital output for the device driver
- assigned the command-override state for the device driver
- assigned the output signal to be reversed or not reversed (You reverse the output if the device is the type which turns off when power is applied to it through the output circuit.)
- selected to either disable or enable feedback FB0 and FB1 and assigned digital feedback inputs for the two-state device driver
- selected to either disable or enable feedback FB0, FB1, FB2, and FB3 and assigned digital feedback inputs for the three-state device driver
- for two-state devices, indicated the state of each feedback when the device is on and off (The device driver needs this information to detect when the device is on and when it is off.)
- for three-state devices, indicated the state of each feedback when the device is on, mid, and off

These selections will be implemented in chapter 13 by entering them on the PCO configuration screens. The selection of digital inputs for feedback signals determines the addresses you need to access for controlling feedback-override-enable and feedback-override-state signals.

Device-Driver Inputs and Outputs

To use the factory-provided device-driver logic, your ladder program must read bits that the device-driver logic controls and control bits that the device-driver logic reads.

Figure 8.3 shows the inputs and outputs for a two-state device driver. Figure 8.4 shows the inputs and outputs for a three-state device driver.

The device-driver logic compares the feedback signals with the command status signal to determine whether or not to trigger a fault alarm.

You will need the following information to generate your ladder program to interface with two-state and three-state driver-driver logic:

- Worksheets 5.1 and 5.2 showing two-state and three-state device assignments (from chapter 5). These worksheets contain the data block address for each device driver. See appendix C for addresses of the bits and words your logic must read from and write to for interfacing with PCO device drivers.
- Table 8.B describes the functions available.

Figure 8.3
Device Driver Logic Combined with Assigned Digital-Input Logic — Showing Inputs and Outputs for a Two-State Device

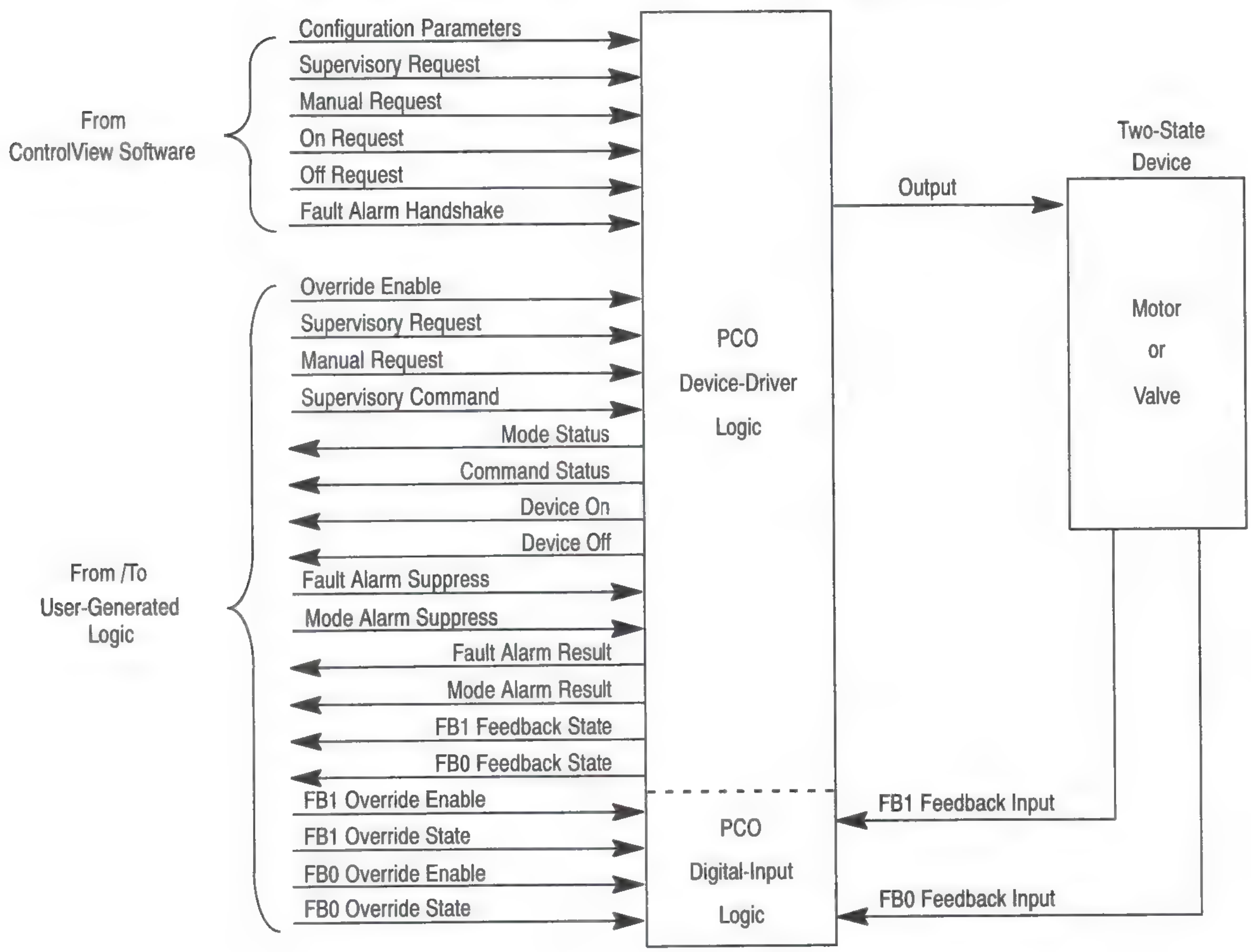


Figure 8.4
Device Driver Logic Combined with Assigned Digital-Input Logic — Showing Inputs and Outputs for a Three-State Device

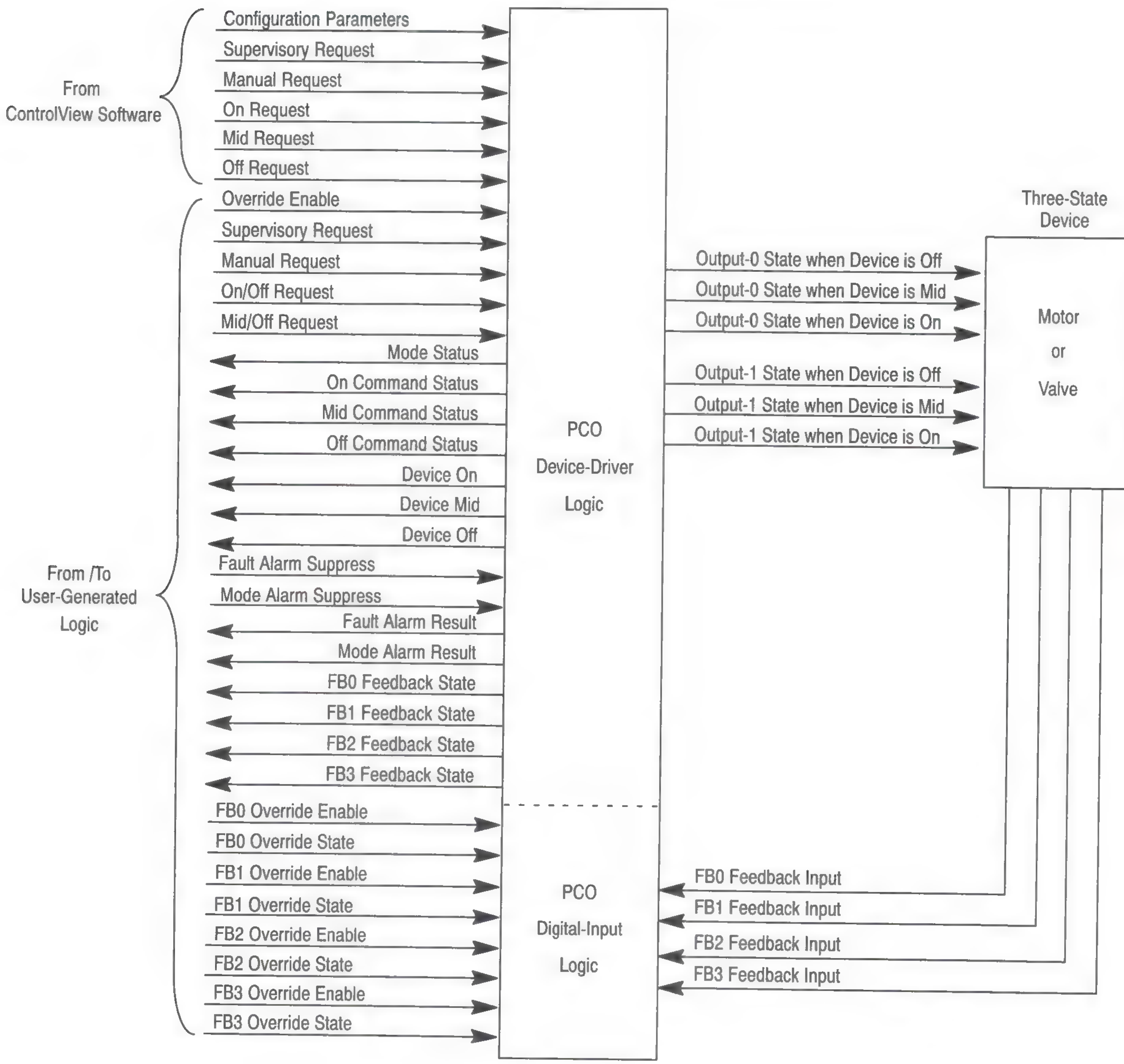


Table 8.B
PCO Logic Functions for DD2 and DD3

To perform this function:	Your ladder logic must do this:	Exceptions/conditions:
Select override mode from the PLC processor.	Turn on the override request from PLC bit.	In this mode, output commanded state(s) will be set to configured override values.
Select manual mode from the PLC processor.	Turn on the manual request from PLC bit and turn off the override request bit.	In this mode, the output(s) commanded state(s) will be determined by the on, mid, and off request from ControlView bits.
Select supervisory mode from the PLC processor.	Turn on the supervisory request from PLC bit, turn off the manual request from PLC bit, and turn off the override request bit.	In this mode, the output(s) commanded state(s) will be determined by the supervisory command bits.
Select manual mode from ControlView.	Turn off the following: supervisory request from PLC, manual request from PLC, and override bit.	ControlView must set manual request from ControlView bit. Operation is the same as when manual mode is selected from the PLC processor.
Select supervisory mode from ControlView.		ControlView must turn on the supervisory request from ControlView bit and turn off the manual request from ControlView bit. Operation is the same as when supervisory mode is selected from the PLC processor.
Determine the state to which the device is being commanded by the driver.	Examine the command-status bit.	This bit reflects the sum of the supervisory, manual, and override signals.
Determine whether the device is on.	Examine the device-on bit.	On = the device is being commanded to turn on, and feedbacks match the commanded state.
Determine whether the device is mid (three-state only).	Examine the device-mid bit.	On = the device is being commanded to go to the mid state, and feedbacks match the commanded state.
Determine whether the device is off.	Examine the device-off bit.	On = the device is being commanded to turn off, and feedbacks match the commanded state.
Check for a fault alarm condition for the device.	Examine the fault-alarm result bit while holding off the fault-alarm suppress bit.	On = device changed state without command, or device has not reached commanded state within time limit set in configuration at ControlView.
Suppress sending fault alarms for this valve to the console.	Turn on the fault-alarm suppress bit.	This bit must be held on to continue alarm suppression.
Check for mode-alarm condition from this driver sent to the console.	Examine the mode alarm result bit while holding off the mode-alarm suppress bit.	On = your ladder logic has commanded the device to change state while the driver is in manual mode.
Override the feedback state to **1**.	Turn on the input override-state bit. Turn on the input override-enable bit.	Feedback state is **1** regardless of the input signal.
Suppress sending mode alarms, for this driver, to the console.	Turn on the mode-alarm suppress bit.	This bit must be held on to continue alarm suppression.
Override the feedback state to **0**.	Turn off the input override-value bit. Turn on the input override-enable bit.	Feedback state is **0** regardless of the input signal.
Remove the input override.	Turn off the input override-enable bit.	The states of the device-on, device-off, and feedback-state bits follow the state of the device.
Determine the state of the feedback signal.	Examine the feedback-state bit.	On = feedback circuit is closed, unless overridden by your logic.

Co-ordinating with Signals from ControlView

ControlView software can control some functions of the device-driver logic for each device if you allow for this in your ladder logic.

Controlling Driver Mode

Your ladder logic can select the driver mode or allow the operator to select the driver mode through the ControlView software as follows:

If the Manual-Request Bit is:	And the Supervisory-Request Bit is:	Then:
1	0	Manual mode is set.
1	1	Manual mode is set.
0	1	Supervisory mode is set.
0	0	The operator can change the mode through the ControlView software

Clearing Handshake Bits

When an alarm suppress bit is on, the alarm result bit is held off continuously. When the alarm suppress bit is off, an alarm-triggering event can turn on the alarm result bit.

The state of the alarm result bit is transferred to the ControlView software. When the ControlView software receives a signal indicating an alarm condition, it sends a signal to turn on the alarm handshake bit. When the alarm triggering condition no longer exists, the alarm handshake bit being on turns off the alarm result bit. The ControlView software keeps the alarm handshake bit on until it detects that the alarm result bit is off. When the ControlView software detects that the alarm result bit is off, it turns off the alarm handshake bit; this is the case because the system has been factory configured for auto reset.

What To Do Next

After reading this chapter, proceed to chapter 9, "Programming Your Ladder Logic".

Chapter 9

Programming Your Ladder Logic

Chapter Objectives

Before you configure the PCO software, you need to complete the necessary programming steps.

This chapter explains how to:

- Create Processor Data Blocks
- Program JSR Instructions
- Delete Unnecessary Functions

Creating Processor Data Blocks

Guidelines for Data and Program Files

Use the following guidelines when programming your PLC-5 processor for use with PCO software:

- Develop your main program in program file 55. Program file 55 is executed every program scan. Put subroutines or STI (selectable timed interrupt) files in program files 56 to 999. The PCO software reserves program files 0 through 54. Do not modify the contents of reserved files.
- Use data table files 125 through 999 for your program. The PCO software reserves data table files 0 through 124. Do not modify the contents of reserved files except as described in this manual.
- If you plan to use PCO software in conjunction with the Batch Management option for ControlView (6190-BAT), do not use data table files 125 through 349. These data table files are used by the Batch Management option.
- The PLC-5 processor supports up to seven levels of subroutine calls. Program file 55, your main program, uses one level; therefore, there are six levels remaining that you can use for subroutine calls.

Designing the Processor Data Table

The first step to applying PCO software is to lay out your processor data table according to the functions you wish to implement. All PCO functions require user-created blocks of elements in the PLC data table. All except two-state and three-state device drivers require both integer and floating point blocks. Table 9.A lists the number of elements required by each function and shows the number of pre-configured tags supplied for each function.

ATTENTION: If you will be using PCO PanelView functions, see the important notice on page 15-2.

Table 9.A
Data Table Statistics

PCO function:	Integer elements required:	Floating point elements required:	Number of preconfigured tags:
PID	80	80	54
DD2	40	0	22
DD3	60	0	32
IFE	90	90	56
IL	50	50	31
IR	60	60	44
IXE	80	80	77
IXHR	80	80	77
QRD	55	55	37
OFE	60	60	26
N-series	210	210	133
PLC faults/alarms			36

The floating point data block for a given function must be in the next file after the integer data block for the same function, and must begin at the same element number. For example, if a PID function is implemented with an integer data block from N300:200 through N300:279, then the floating point block must reside at F301:200 through F301:279.

Important: Never overlap data blocks. This could result in unpredictable operation of the control functions. In addition to data blocks, you must reserve block transfer (BT-type) and timer (T-type) data elements for the analog I/O functions. These requirements are listed below:

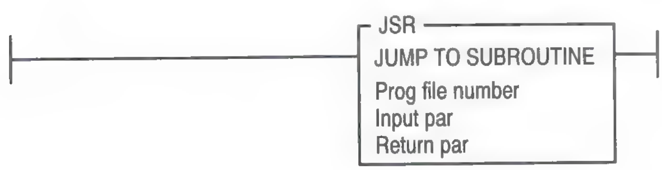
- Each analog I/O function requires one timer element in file T43, one BT-type element in file BT44, and one BT-type element in file BT45. For example, if you implement a total of 10 analog I/O device driver functions, you must create timer elements up to at least T43:9, BT44:9, and BT45:9.

Program JSR Instructions

You must insert a JSR (jump-to-subroutine) instruction in your ladder program for every PCO function you want to use. You can add JSR instructions anywhere in your ladder program.

Entering a JSR instruction

1. Using 6200 Series software procedures, enter a JSR instruction.



2. Enter the program file number that the JSR instruction references.

   The number you specify depends on the PCO function you wish to execute. Table 9.B lists the available functions and their program file numbers.

Table 9.B
PCO Function Program File Numbers

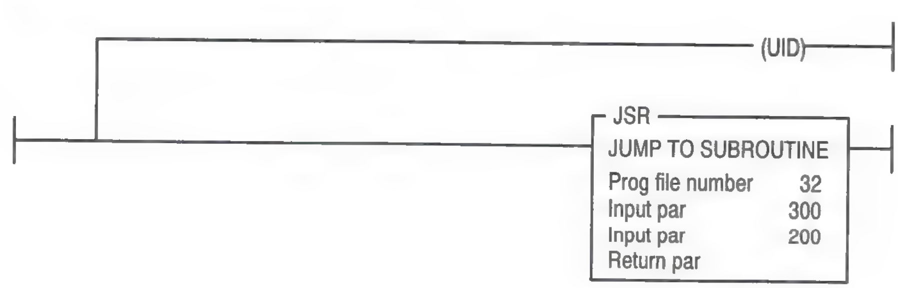
PCO function:	Program file number:
IFE	10
IL	12
IR	14
IXE	16
IXHR	18
QRD	20
OFE	22
N-series	24
PID	32
DD2	36
DD3	38
PanelView	45

3. Enter two input parameters.

The first parameter references the data table file number of the integer data block to be used with the function you are adding. The second parameter references the starting element number of the integer data block.

For example if you are adding a PID function with an integer data block starting at N300:200, your JSR instruction should look like that in Figure 9.1.

Figure 9.1
JSR Instruction without Conditioning



4. In addition to the JSR instruction, you may have to add a UID (user interrupt disable) instruction before the JSR instruction and/or a UIE (user interrupt enable) instruction after the JSR instruction. Table 9.C shows when these are appropriate.

Table 9.C
Example of JSR Instruction Conditioning

PCO function:	STI or non-STI only: STI	Non-STI	Both STI and non-STI: STI	Non-STI
Analog I/O and PID	JSR	JSR	JSR	(UID) JSR
Two-state and Three-state devices	JSR	JSR	JSR	(UID) JSR (UIE)

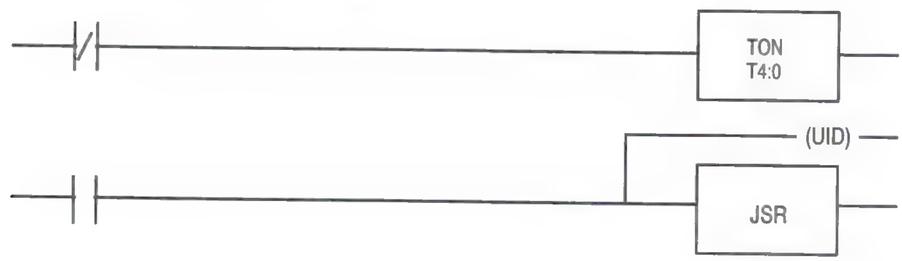
As shown in Table 9.C:

- If a PCO function is called only from an STI program file or only from a non-STI program file, no UID or UIE instruction is necessary.
- If a PCO analog I/O or PID function is called both from an STI program file and a non-STI program file, each JSR instruction in the non-STI program file must be preceded by a UID instruction.
- If a PCO two-state or three-state device-driver function is called from both an STI program file and a non-STI program file, each JSR in the non-STI program file must be preceded by a UID instruction and followed by a UIE instruction.

The UID instruction prevents an STI routine from interrupting the execution of a PCO function. Using the UID instruction eliminates the conflict that would otherwise exist if the STI routine also uses PCO functions.

Normally, you do not need to condition the UID and JSR instructions. The only time you may need to condition a rung containing a JSR instruction is if you do not plan on obtaining the process variable for a non-STI PID loop from an analog function. When this is the case, you must use a contact in front of the JSR instruction to trigger the PID instruction at the appropriate update time (Figure 9.2). If, however, your non-STI PID loop will be obtaining its process variable directly from an analog input function, e.g., the IFE function, then you should not condition the JSR instruction.

Figure 9.2
JSR Instruction with Conditioning



Important: Do not use a UID instruction before the JSR instruction to the PanelView routine and do not use the PanelView routine within an STI routine.

Delete Unnecessary Functions

You should delete the program files for all PCO functions not needed for your application. This will free processor memory making it available for other uses.

In addition to the program file, there may be other files that you can delete, depending on the function that is not needed. Table 9.D lists the files you should delete when a function is not required.

Table 9.D
Program and Other File Numbers

Function:	Program file number:	Program file size:	Other files:
IFE	10	2028	N48, N49, F50
IL	12	1823	N52, N53, F54
IR	14	1859	N56, N57, F58
IXE	16	1969	N60, N61, F62
IXHR	18	2250	N64, N65, F66
QRD	20	2055	N68, N69, F70
OFE	22	2012	N72, N73, F74
N-series	24	7312	N76, N77, F78
PID	32	3662	N100, N101, F102, F103, B104
DD2	36	1678	N110, N111, B112
DD3	38	2604	N114, N115, B116
PanelView	45, 46, 47, 48, 49, 50, 51, 52, 53	2079	N119, B120, F121, N122, C123, ST124

For example, if you do not need the IFE function, you should delete program file number 10 in the PCO ladder code. In addition, you should delete the data table files associated with the IFE function, i.e., N48, N49, and F50. Refer to appendix C for more information about data table and program file layouts.

What To Do Next

When you have finished programming your ladder logic:

If:	Go to:
you have not configured your system	section 4, "Configuring Your System"
you have programmed and configured your system	section 5, "Operating and Monitoring Your System"

Section 4

Configuring Your System

Preparing for Configuration – **Chapter 10**

Configuring PID Functions – **Chapter 11**

Configuring Analog I/O Functions – **Chapter 12**

Configuring Device Driver Functions – **Chapter 13**

Create Custom Screens with the PCO Symbol Library and Mouse-GRAFIX – **Chapter 14**

Configuring PanelView – **Chapter 15**

Chapter 10 provides information about cloning template tags, security, alarming and handshaking, and describes how to use PCO configuration screens.

Chapters 11, 12, and 13 describe how to use the tags you cloned in chapter 10 to configure your PID, Analog I/O and Device Driver functions.

Chapter 14 shows you how to create customized screens.

If you have a PanelView Operator Interface terminal, chapter 15 describes how to configure the PCO PanelView functions.

Chapter 10

Preparing for Configuration

Chapter Objectives

After the programming is complete, you need to configure the PCO functions. This chapter includes information about:

- template-structured tags
- cloning template-structured tags
- loading a database
- configuring security
- starting alarming and handshaking
- preparing to configure PID loops, analog I/O modules, and device drivers

This chapter prepares you for configuring your loops, analog I/O modules, or device drivers. Specific information is provided in the following chapters.

Template-Structured Tags

PCO includes a ControlView database containing one template tag for each type of loop, analog function, and two & three-state device driver. These tags provide the interface between ControlView and the PCO ladder logic functions. Before you can use or configure PCO functions, you must clone the template tags to create one copy for each function you will have.

For example, if you have:

- 10 two-state devices
- five PID loops
- and two N-Series modules

You must:

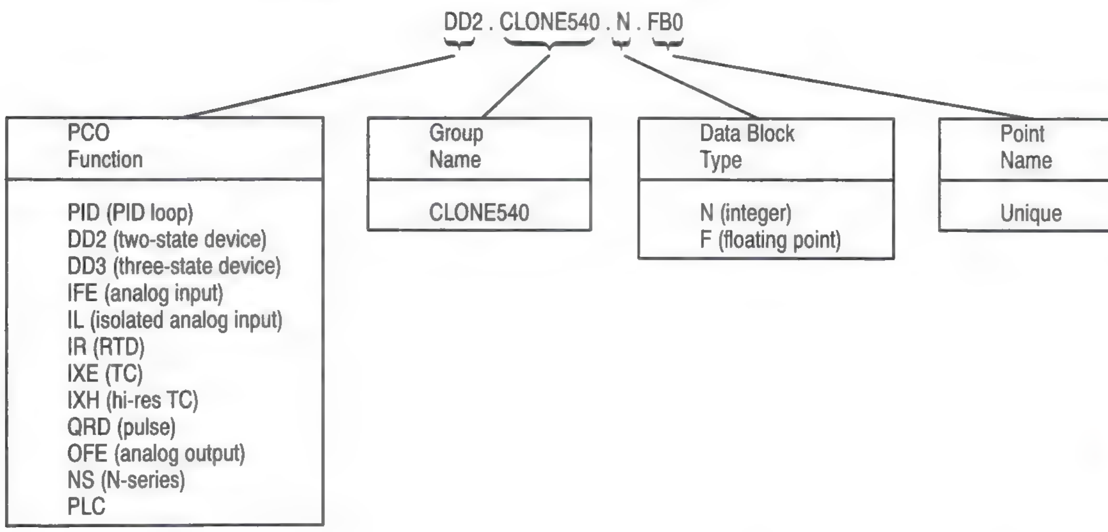
Clone the template tag for:	Number of copies needed:
two-state devices	10
PID loops	5
N-series modules	2

Important: DO NOT EDIT the template tag. Edit only the clones you create.

Reading Tags

Each database tag consists of four fields separated by periods. You can modify only the Clone540 name through the clone function. Figure 10.1 shows how to read ControlView database tags.

Figure 10.1
ControlView Tags



Clone Template- Structured Tags

Within each functional group there is a template tag group. You should clone each group for each function which you have added in the PLC-5 processor.

Important: For this release, the only template tag group provided within each functional group is CLONE540. You use this group to add functions to PLC-5/30, -5/40, or -5/60 processors.

To clone a group, do the following:

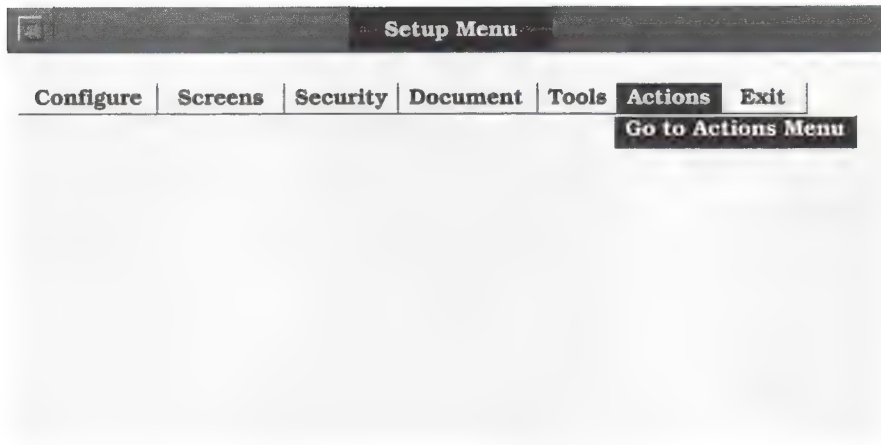
- unload the database
- select a group
- clone a template
- modify the tags

Unload the Database

If the database is already loaded, you must unload it before you can clone the templates. To unload the database, do the following:

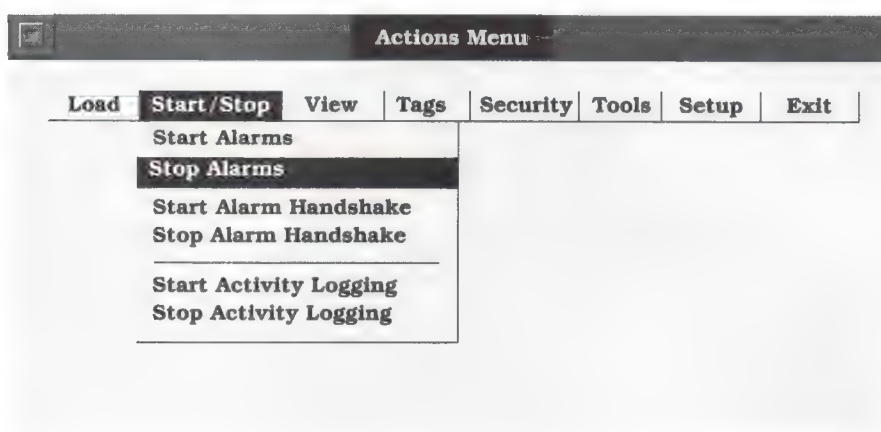
1. Start on the ControlView Setup Menu screen.
2. Select `Go To Actions Menu` under `Actions` (Figure 10.2).

Figure 10.2
Setup Menu Screen



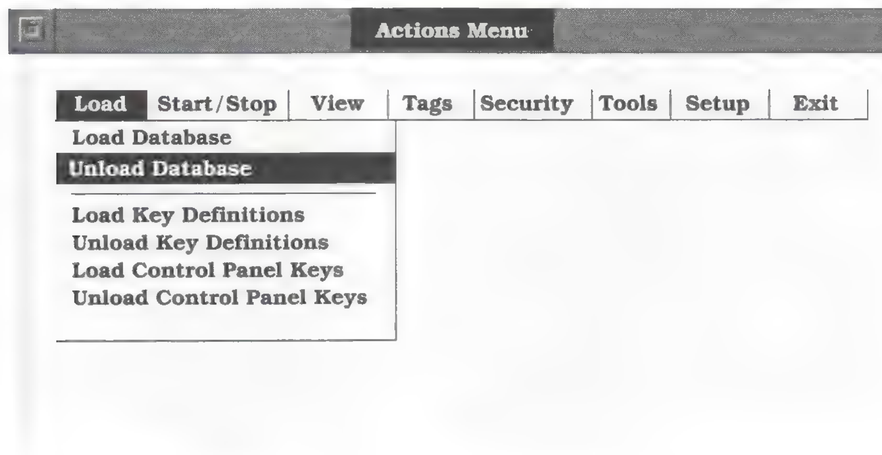
3. Select `Stop Alarms` under `Start/Stop` (Figure 10.3).

Figure 10.3
Actions Menu Screen



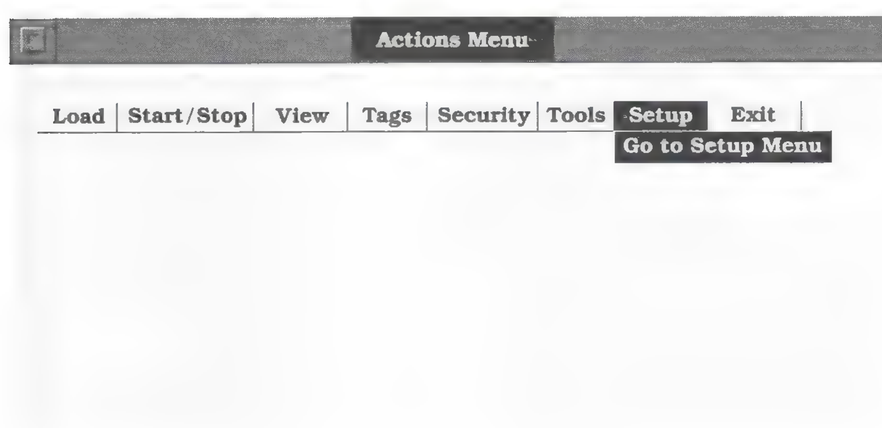
4. Select `Unload Database` under `Load` (Figure 10.4).

Figure 10.4
Actions Menu Screen



5. Return to the Setup Menu screen by selecting `Go To Setup Menu` under `Setup` (Figure 10.5).

Figure 10.5
Actions Menu Screen

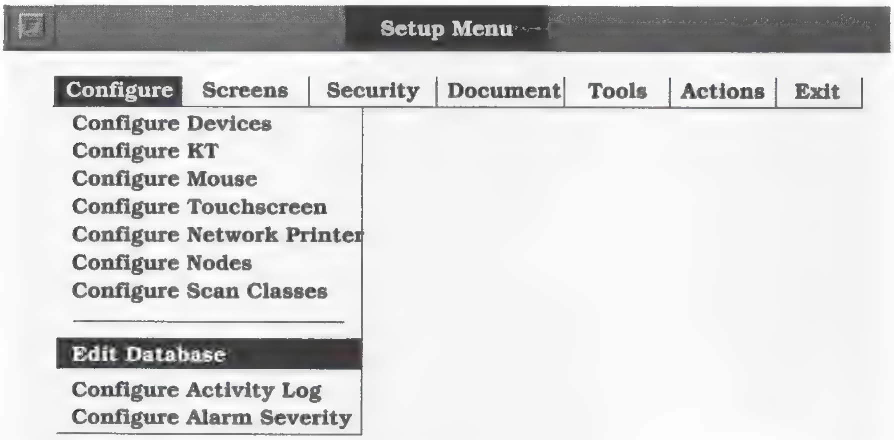


Select a Group

1. Start on the Setup Menu screen.

2. Select `Edit Database` under `Configure`; then, select a database from the list in the pop-up window (Figure 10.6). The name of the database supplied with PCO is `pco_xxx` where `xxx` is the release number.

Figure 10.6
Selecting a Database to Edit



3. Select a group by placing the highlighters on the name of the desired group and `Select`, then pressing **[Enter]** (Figure 10.7). Table 10.A lists the actions you can perform from this screen.

Figure 10.7
Selecting a Group

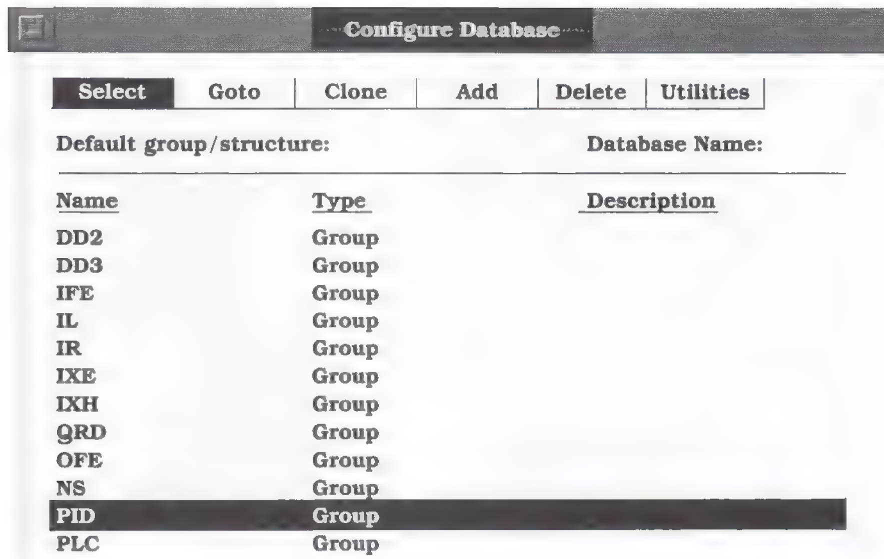
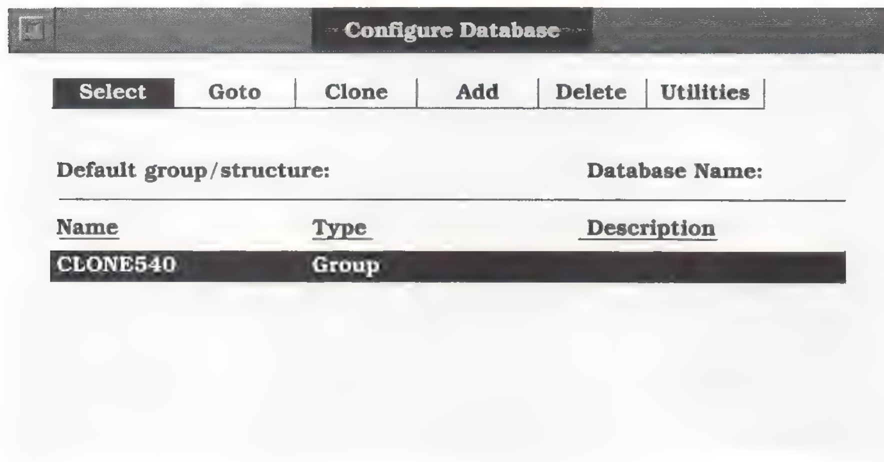


Table 10.A
Available Actions from the Configuration Database Screen

If you want to:	Select:
Select a group to clone, edit, or delete	Select
Jump directly to a specified tag (You are prompted to enter the tag name.)	Goto
Replicate the tags for a selected group	Clone
Add a new tag to the selected group	Add
Remove a group from the list (You will be prompted for confirmation)	Delete
View the Database Utilities screen which shows the date of last modification, number of I/O points, number of alarm points, number of structured tags, and number of points in each scan class.	Utilities

The Configuration Database screen appears (Figure 10.8).

Figure 10.8
Configure Database Screen After Selecting a Group

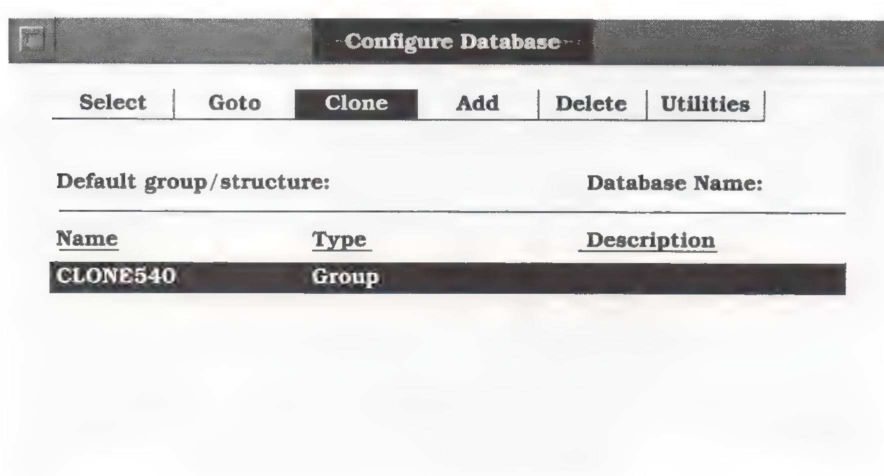


Clone the Template

1. Start on the Configure Database screen.

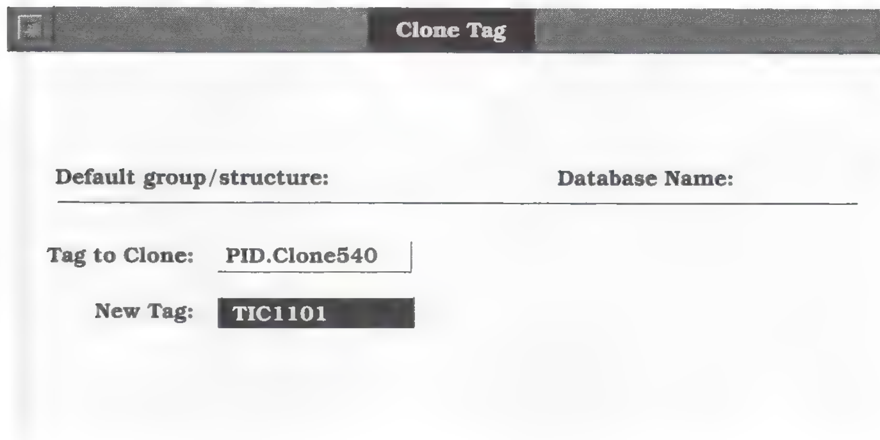
2. Clone the default template (Clone540 for example) by placing the highlighters on `Clone540` and `Clone`, then pressing **[Enter]**

Figure 10.9
Cloning a Tag



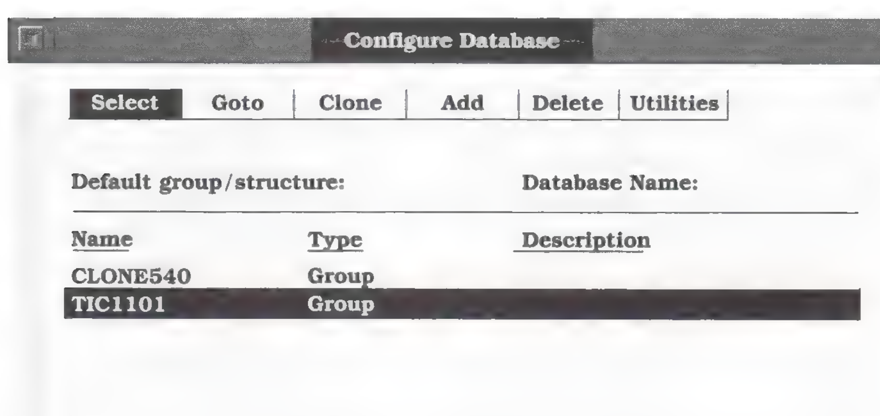
3. Type a name for the new group in the appropriate field on the Clone Tag screen (Figure 10.10) and press `Accept [+]`

Figure 10.10
Specifying the Tag Name



4. After the cloning process finishes, the Configure Database screen returns. Note that the new group has been added to the list (Figure 10.11). The cloning process can take several minutes when cloning a large tag with a large database.

Figure 10.11
Configure Database Screen After Cloning

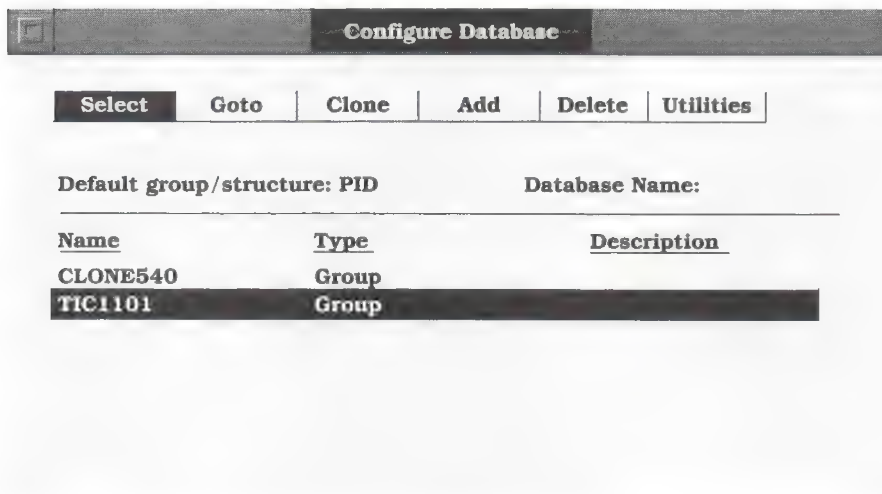


Modify the Tags

1. After cloning a group, the Configure Database screen shows a list of the tags in that group.

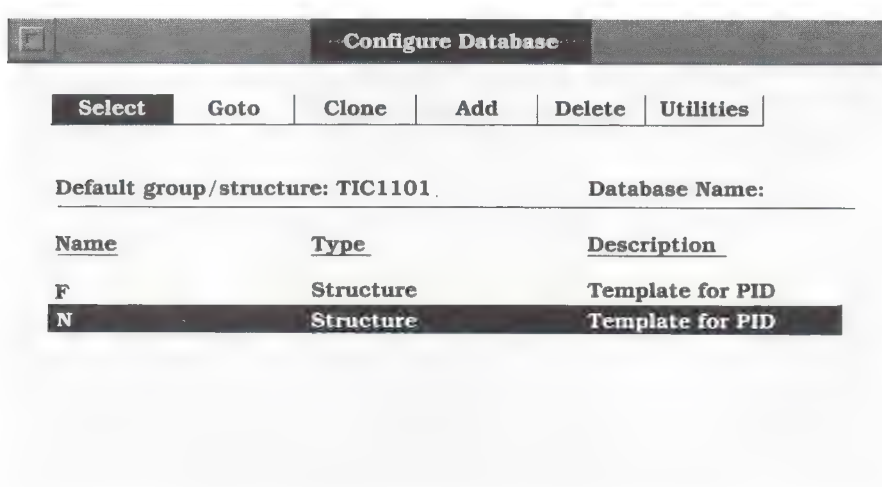
2. Select a group (Figure 10.12).

Figure 10.12
Selecting a Group



The Configuration Database screen appears (Figure 10.13). Table 10.A lists the actions you can perform from this screen.

Figure 10.13
Configure Database Screen



3. Select N (integer type structure). The Configure Structure screen appears (Figure 10.14). Table 10.B lists the actions available from this screen.

Figure 10.14
Configuring Integer Structure

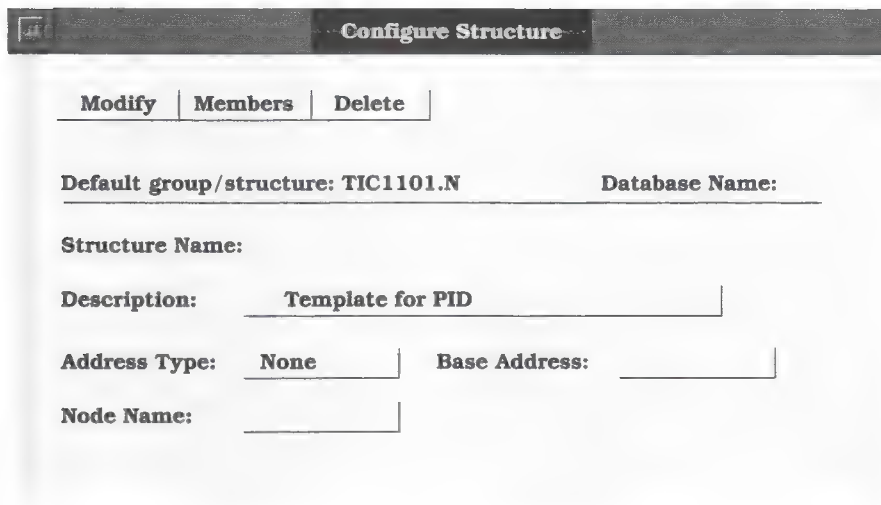


Table 10.B
Actions Available from Configure Structure Screen

If you want to:	Select:
Edit the description, address type, base address, or node name	Modify
Clone, edit, add, or delete members	Members
Remove the tag (and all its members) from the database. (You will be prompted for confirmation)	Delete

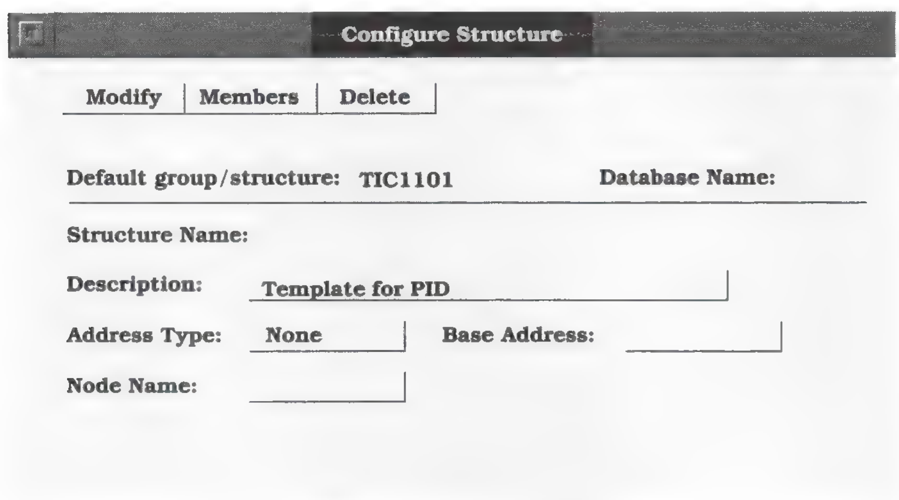
For all functions you must modify the description, address type, base address, and node name. For the description you may use any description of this function. The description will be displayed on the PCO configuration screens. For the address type enter PLC-5/40, or -5/60. For the base address enter the starting address of the integer data block you defined for the function. For example, if the data block of a two-state device driver is from N300:200 to N300:239, enter N300:200 as the base address.

Finally, enter the node name corresponding to the processor node containing this function.

Important: Clone once for each configured node or PLC station. The PLC template, however, is an exception. The address type (PLC-5/30, -5/40, or -5/60) and the base address (N21:0) are already entered. You must enter a valid configured node name.

4. You must configure both integer and floating point structures for analog I/O and PID functions. Select `F` (floating point type). The Configuration Database screen appears with a list of tags available (Figure 10.15).

Figure 10.15
Configuring Floating Point Structure

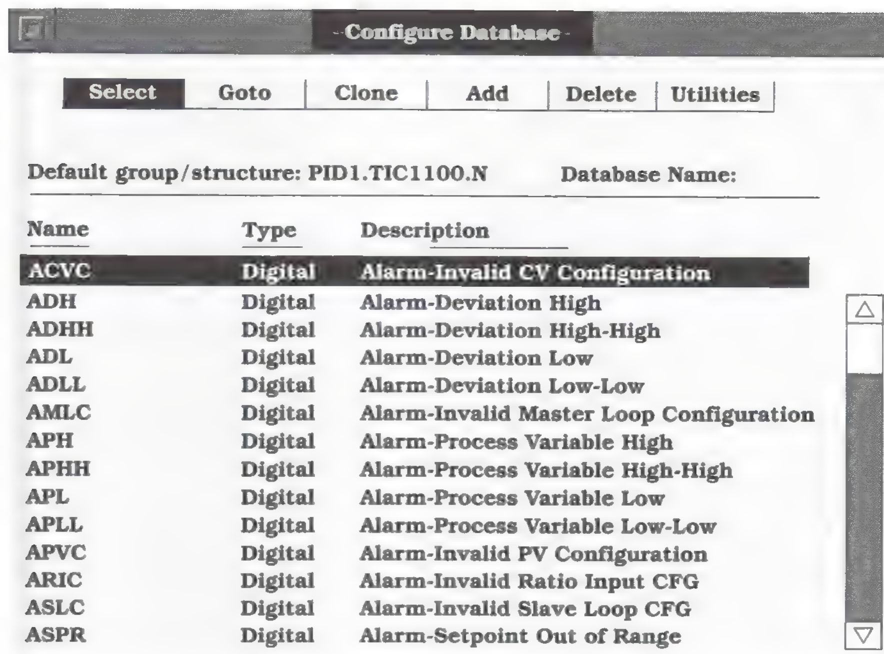


The description, address type, and node name should be identical for both structures. The base address of the floating point structure should be one file number greater than the base address of the integer structure, since the floating point data block is always defined as being the next greater file than the integer data block. The starting element offsets must be identical.

5. Select `Members`

   The Configuration Database screen appears with a list of tags available (Figure 10.16). Table 10.A lists the actions you can perform from this screen.

Figure 10.16
Selecting Members



On Alarm tags that have handshaking (refer to Appendix A), you must:

a. select the tag

b. select the alarm

c. modify the handshake reference to specify the correct tag.

6. When you are done modifying the configuration, return to the Setup Menu screen by pressing `[Esc]` several times.

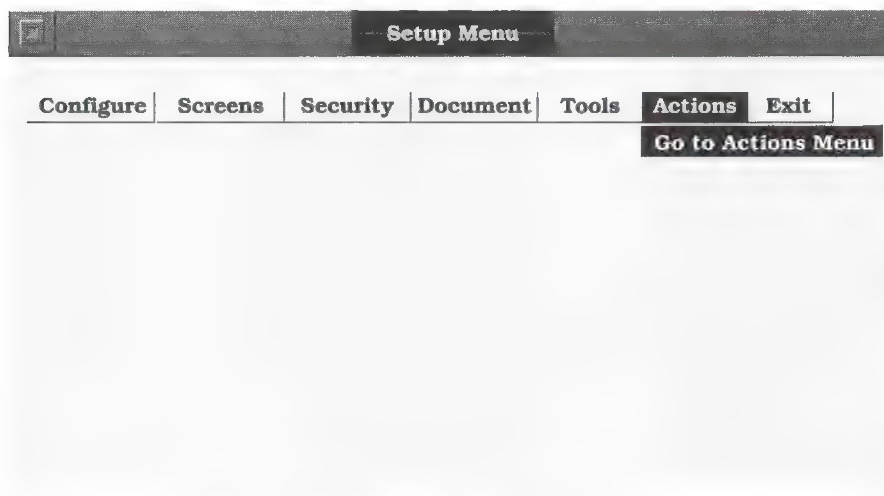
Load a Database

You must load a database before you can configure PCO functions. To load a database, do the following:

1. Start on the Setup Menu screen.

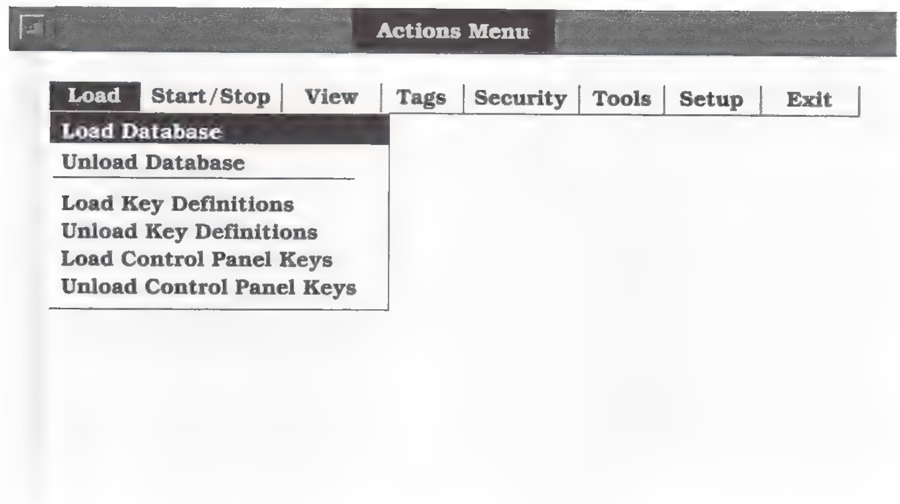
2. Select `Go To Actions Menu` under `Actions` (Figure 10.17).

Figure 10.17
Setup Menu Screen



3. Select `Load Database` under `Load`; then, select a database from the list in the pop-up window (Figure 10.18). The name of the database supplied with PCO is `pco_xxx` where `xxx` is the release number.

Figure 10.18
Actions Menu Screen



Configure Security

ControlView lets you configure user accounts to monitor use of the batch process control system, and for preventing unauthorized changes to the batch process control system. You can protect individual tags, commands, macros, and graphics with security codes. In addition, you can protect PCO specific commands and screens by entering the appropriate command or screen name into the security system.

Refer to the ControlView Core User Manual for information on how to set up security on your system. Table 10.C lists the security codes for PCO.

Table 10.C
PCO Security Codes

Security code:	Permits access to:
BM_DEVICE_STRUCTURES	Device structures configuration function
BM_IFE_CONFIGURE	IFE configuration function
BM_IL_CONFIGURE	IL configuration function
BM_IR_CONFIGURE	IR configuration function
BM_IXE_CONFIGURE	IXE configuration function
BM_IXH_CONFIGURE	IXHR configuration function
BM_OFE_CONFIGURE	OFE configuration function
BM_QRD_CONFIGURE	QRD configuration function
BM_PID_CONFIGURE	PID configuration function
BM_DD2_CONFIGURE	Two-state device driver configuration function

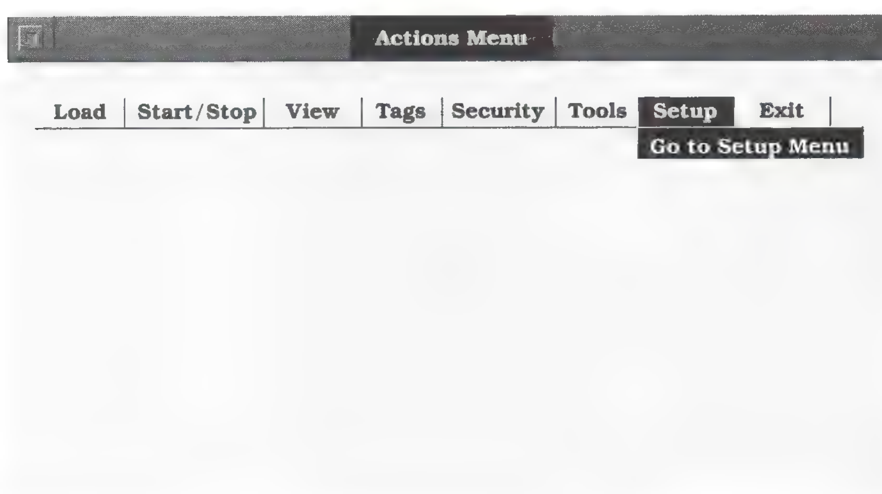
Security code:	Permits access to:
BM_DD3_CONFIGURE	Three-state device driver configuration function
BM_NSE_CONFIGURE	N-series configuration function

Start Alarming and Handshaking

You must start alarming and handshaking from the ControlView command line. To perform this task, do the following:

1. Press `[Alt-C]` to bring up the ControlView command line.
2. Type **`alarmon /h [Enter]`** to start alarming and handshaking.
3. Return to the Setup Menu screen by selecting `Go To Setup Menu` under `Setup` (Figure 10.19).

Figure 10.19
Actions Menu Screen



Configuring PCO Functions

Chapters 11 through 13 show you how to configure the specific PCO functions. Table 10.D lists the information covered.

Table 10.D
PCO Function Descriptions

If you want to configure this function:	Refer to:
PID Loop	chapter 11
IFE	chapter 12
IL	chapter 12
IR	chapter 12
IXE	chapter 12
IXH	chapter 12
QRD	chapter 12
N-series	chapter 12
OFE	chapter 12
DD2	chapter 13
DD3	chapter 13

Using PCO Configuration Screens

When you choose device structures, the appropriate Device Structures screen appears (Figure 10.20). Table 10.E lists the actions you can perform.

Figure 10.20
IFE Device Structures Screen

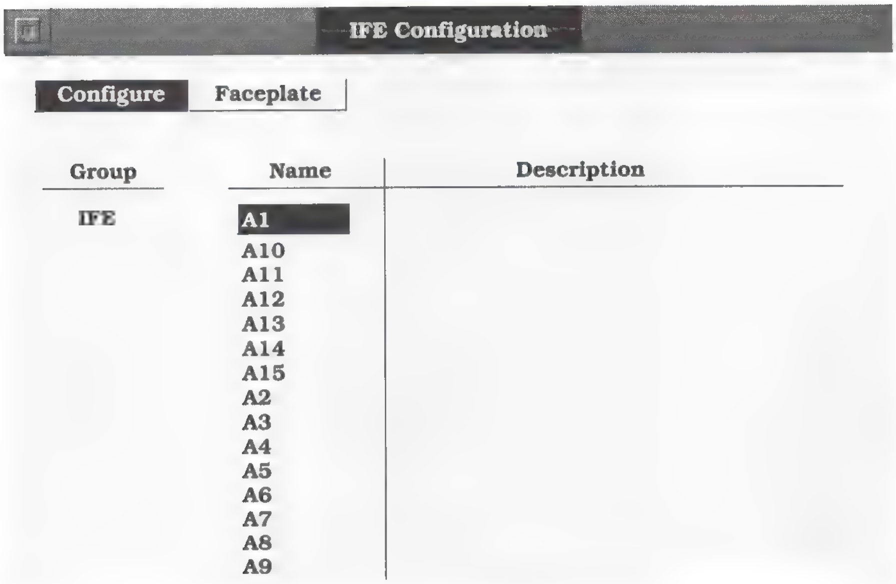


Table 10.E
Available Actions from the Device Structures Screen

If you want to:	Select:
Change the configuration of this structure	Configure
View the faceplate corresponding to this function	Faceplate

All PCO configuration screens have the same options on the menu bar. For example, Figure 10.21 shows the IFE configuration screen. Table 10.F lists the actions you can perform.

Figure 10.21
IFE Configuration Screen

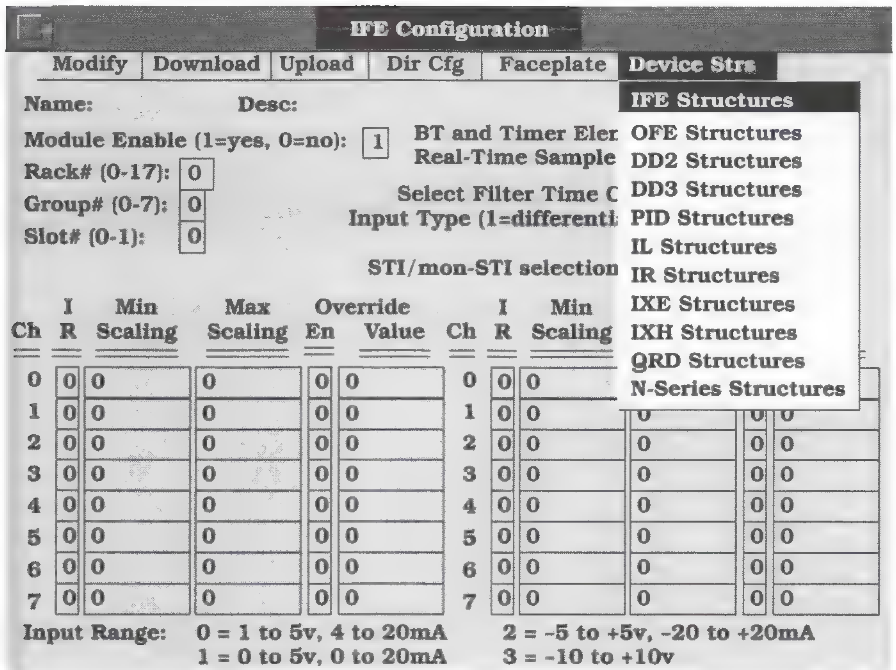


Table 10.F
Available Actions from the IFE Configuration Screen

If you want to:	Select:
Edit one or more fields on this configuration screen	Modify
Download the configuration parameters shown to a PLC processor, a disk file, or both	Download
Upload existing configuration parameters from a PLC processor or a disk file	Upload
Specify a directory for upload/download configuration files	Directory Configuration
View the faceplate corresponding to this function	Faceplate
Select the device structures corresponding to this function	Device Structures

The following paragraphs provide additional information about the upload and download features.

Upload/Download to a PLC

When you choose to upload or download to a PLC processor, you are transferring the configuration data to or from the appropriate data table files in the PLC processor. Before you can do this, there must be:

- communications established with the PLC processor
- ControlView node configured for PLC processor
- data table files created and assigned to the function you wish to download or upload

Upload/Download to a File

When you choose to upload or download to a file, the PCO Software creates a file on the hard disk in the directory you configured under DIR CFG. It then downloads or uploads the configuration data to this file. You must download to a file before you can upload from a file.

This function allows you to perform configuration without being connected to the PLC processor. When you connect to the PLC processor later, you can upload from the file and download to the PLC processor for each function.

Selective File Upload

When you have several similar instances of a function to configure, for example, five similar PID loops, the selective file upload command allows you to perform a file upload from a different function structure. You can then modify any fields as needed and then download to a file or PLC processor.

What To Do Next

After you have created the necessary data files and cloned all the tags you will need for PID Loops, Analog I/O Modules, and Device Drivers:

If you want to configure:	Go to:
PID loops	chapter 11, "Configuring PID Functions"
Analog I/O modules	chapter 12, "Configuring Analog I/O Functions"
Device Drivers	chapter 13, "Configuring Device-Driver Functions"
Custom screens	chapter 14, "Creating Custom Screens with the PCO Symbol Library and Mouse-GRAFIX"
PanelView	chapter 15, "Configuring PCO PanelView Functions"

Chapter 11

Configuring PID Functions

Chapter Objectives

You configure PID functions by using ControlView and PCO software.

This chapter describes:

- prerequisities for configuring PID loops
- how to access the PID loop configuration screens
- how to configure PID loops

Database Tags

Refer to Table A.B in appendix A for descriptions of the ControlView tags available for the PID loop function.

Prerequisites

Before you can configure functions for PID loops, you must:

- create the necessary data files for each device in the PLC-5 processor data table
- be logged on to ControlView
- clone the ControlView tag database to create a group of tags for each PID loop
- load the tag database
- start Alarming to enable configuration alarms

Refer to chapter 10 for procedures to perform these tasks.

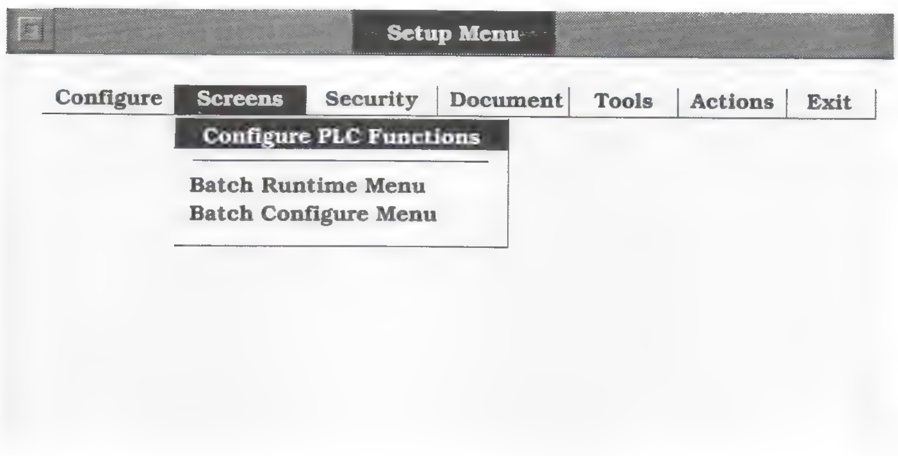
Access the Configuration Screens

To access the PID loop configuration screens, do the following:

1. Start on the ControlView Setup Menu screen.

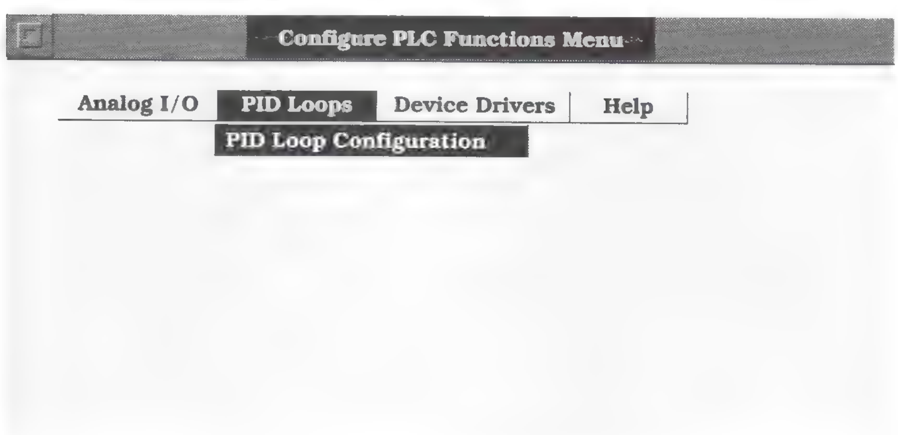
2. Select `Configure PLC Functions` under `Screens` (Figure 11.1).

Figure 11.1
Setup Menu Screen



3. Select `PID Loop Configuration` under `PID Loops` (Figure 11.2).

Figure 11.2
Configure PLC Functions Menu Screen



4. Select a PID loop to configure from the list that appears and press `[Enter]`

When the screen first appears, it will automatically upload configuration data from a file, if one exists. If a file does not exist, default configuration data values are displayed. If you want to modify a configuration that exists at the PLC processor, you must first do an "Upload from the PLC". Refer to chapter 10 for more information on Uploading and Downloading files from the PLC processor.

Configure PID Loops

The configuration screen for the PID function has two pages. The first page appears when you access the PID Loop Configuration screen. Use `[Pg Up]` and `[Pg Dn]` to toggle between the first and second pages (Figure 11.3 and Figure 11.4).

Figure 11.3
PID Configuration Screen, Page 1

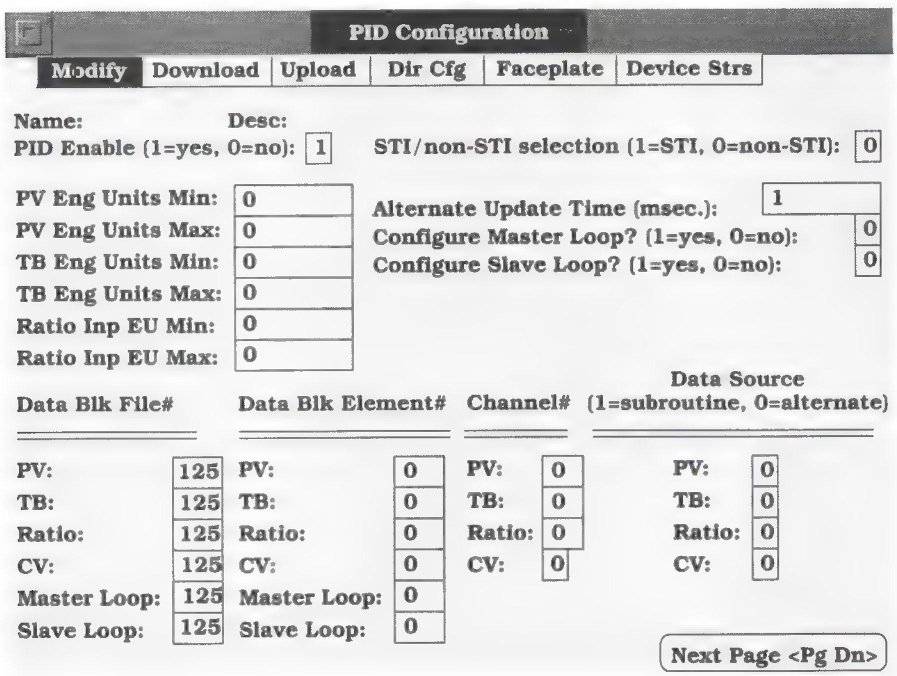
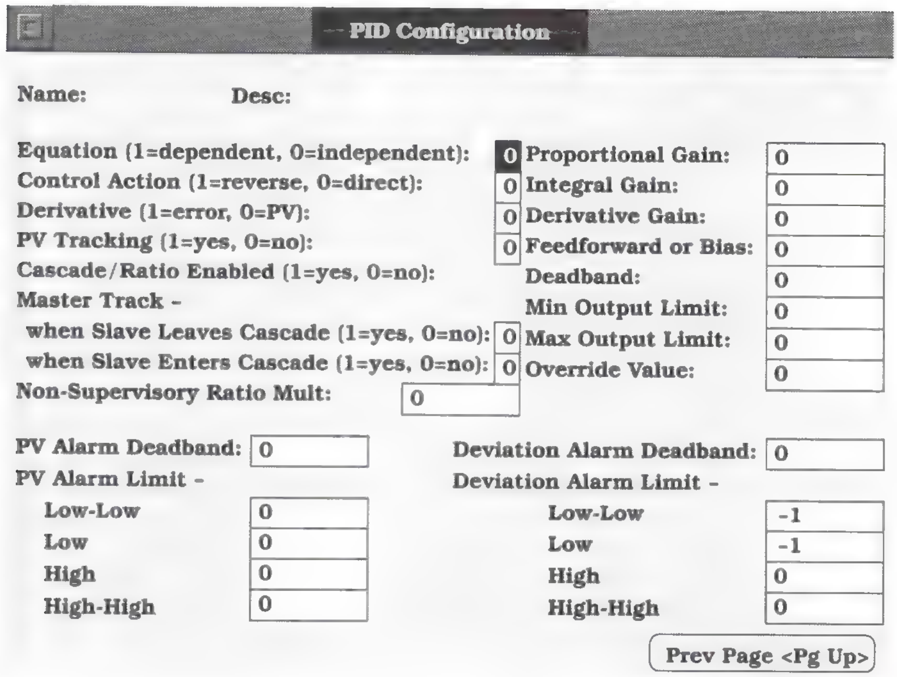


Figure 11.4
PID Configuration Screen, Page 2



To configure a PID loop, do the following:

1. Start on the appropriate PID Configuration screen.

   Using completed worksheet 3.1, PID Assignments, as a guide, fill in the configuration screens. For descriptions of the fields, see Table 3.A (page 3-3).

2. Select `Modify`

3. Select a field to edit. Use the cursor keys or the mouse to select the field.

4. Type the new data and press `[Enter]`

5. When you are finished editing fields, press `[Esc]` to return to the menu.

6. Perform a PLC or File Download, or both to save the changes.

   When you perform the download, all values are checked for validity. If any value is invalid, it will be highlighted in red and an error message will be displayed. Because of the relationships between the configuration values, it is possible for one field to show an error that is really due to an error in another field. When this occurs, select and correct the erroneous field. All fields must contain valid entries, even if they are not applicable to your application.

   Once you have corrected the error, you must select a download function again.

7. Once you have downloaded the configuration for the current structure, you can press `[Esc]` to select another structure of the current type, or you can select `Device Strs` to change to a different function type.

What To Do Next

After you have configured your PID functions:

If you want to configure:	Go to:
Analog I/O modules	chapter 12, "Configuring Analog I/O Functions."
Device Drivers	chapter 13, "Configure Device-Driver Functions"
Custom screens	chapter 14, "Creating Custom Screens with the PCO Symbol Library and Mouse-GRAFIX"
PanelView	chapter 15, "Configuring PCO PanelView Functions"

When you have configured everything you need for your system, read section 5 to learn how to operate and monitor your system.

Chapter 12

Configuring Analog I/O Functions

Chapter Objectives

You configure analog I/O functions by using ControlView and PCO software.

This chapter describes:

- prerequisities for configuring analog I/O functions
- how to access the analog I/O configuration screens
- how to configure analog I/O functions

Database Tags

Each analog I/O function has a set of ControlView database tags. Table A.A in appendix A shows where the descriptions appear.

Prerequisites

Before you can configure device-driver functions for analog I/O, you must do the following:

- create the necessary data files for each device in the PLC-5 processor data table
- be logged on to ControlView
- clone the ControlView tag database to create a group of tags for each analog I/O function
- load the tag database
- start Alarming to enable configuration alarms

Refer to chapter 10 for procedures to perform these tasks.

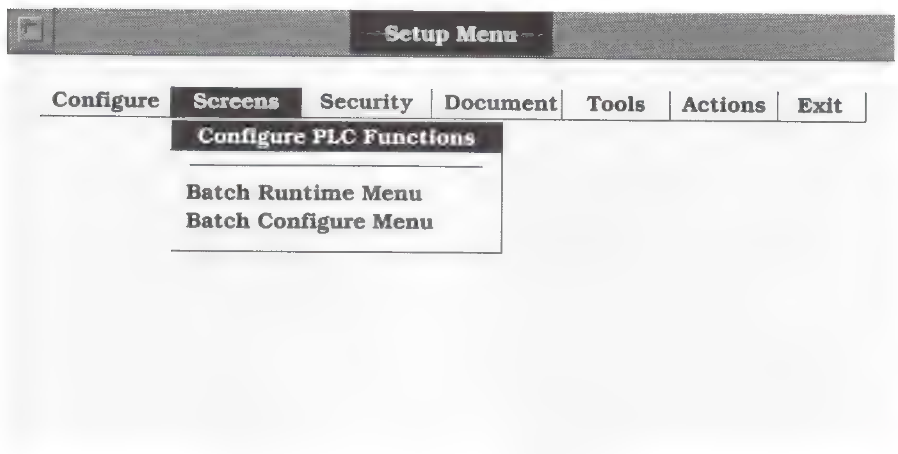
Accessing the Configuration Screens

To access analog I/O function configuration screens, do the following:

1. Start on the ControlView Setup Menu screen.

2. Select `Configure PLC Functions` under `Screens` (Figure 12.1).

Figure 12.1
Setup Menu Screen



3. Select the desired function (`IFE` for example) under `Analog` (Figure 12.2).

Figure 12.2
Configure PLC Functions Menu Screen

4. Select a device to configure from the list that appears.

Configure Analog I/O Functions

Every analog I/O function has a configuration screen. The procedures for configuring all functions are similar, even though the screens are unique to each function.

When the screen first appears, it will automatically upload configuration data from a file, if one exists. If a file does not exist, default configuration data values are displayed. If you want to modify a configuration that exists at the PLC processor, you must first do an “Upload from the PLC”. Refer to chapter 10 for more information on Uploading and Downloading files from the PLC processor.

To configure an analog I/O device-driver function, do the following:

1. Start on the appropriate configuration screen.
2. Select `Modify`
3. Select a field to edit. Use the cursor keys or the mouse to select the field.
4. Type the new data and press **[Enter]**
5. When you are finished editing fields, press **[Esc]** to return to the menu.
6. Perform a PLC or File Download, or both to save the changes.

   When you perform the download, all values are checked for validity. If any value is invalid, it will be highlighted in red and an error message will be displayed. Because of the relationships between the configuration values, it is possible for one field to show an error that is really due to an error in another field. When this occurs, select and correct the erroneous field. All fields must contain valid entries, even if they are not applicable to your application.

   Once you have corrected the error, you must select a download function again.

7. Once you have downloaded the configuration for the current structure, you can press **[Esc]** to select another structure of the current type, or you can select `Device Strs` to change to a different function type.

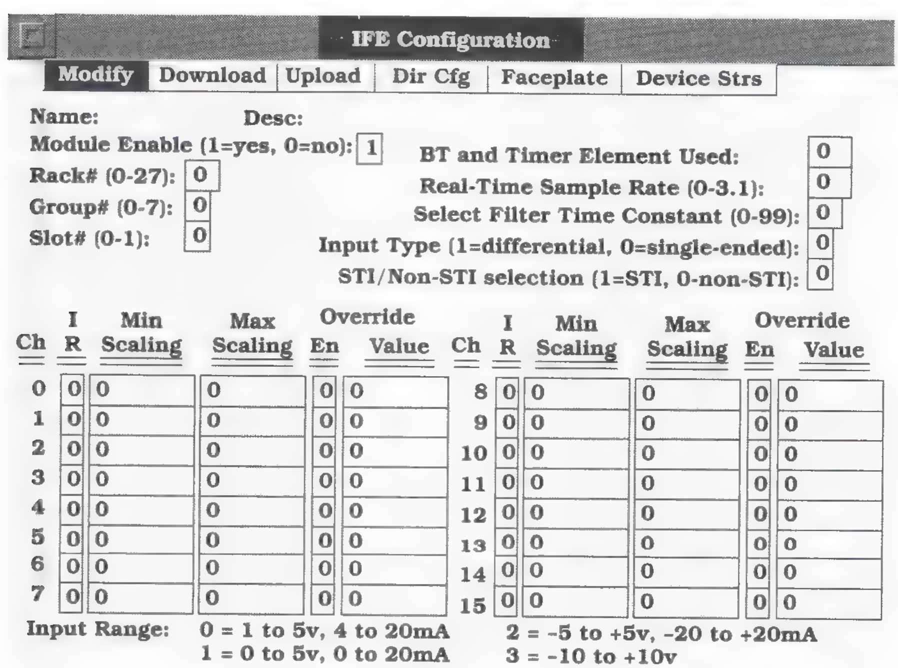
Table 12.A
Configuring Analog I/O Functions

If you want to configure:	See page:
IFE Functions (analog input)	12-4
IL Functions (isolated analog input)	12-5
IR Functions (RTD)	12-6
IXE Functions (TC)	12-7
IXHR Functions (hi-res TC)	12-8
QRD Functions (pulse)	12-9
OFE Functions (analog output)	12-10
N-series Functions (analog I/O)	12-11

Configuring IFE Functions

Figure 12.3 shows the configuration screen for an IFE function. Using completed worksheet 4.1, 1771-IFE Assignments, as a guide, fill in the configuration screen. For descriptions of the fields on the IFE Function Configuration Screen, see Table 4.A (page 4-5).

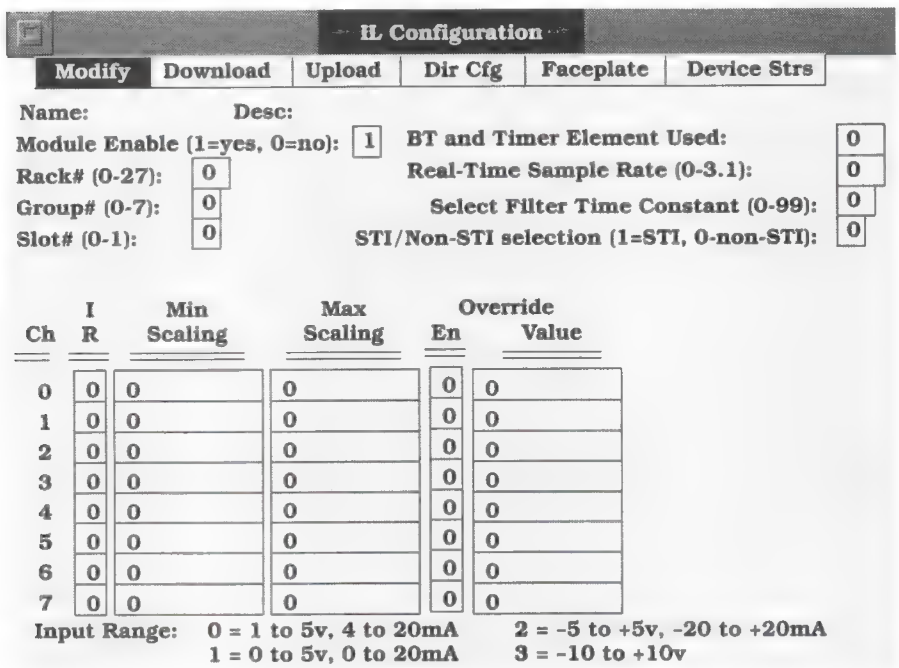
Figure 12.3
IFE Function Configuration Screen



Configuring IL Functions

Figure 12.4 shows the configuration screen for an IL function. Using completed worksheet 4.2, 1771-IL Assignments, as a guide, fill in the configuration screen. For descriptions of the fields on the IL Function Configuration Screen, see Table 4.B (page 4-8).

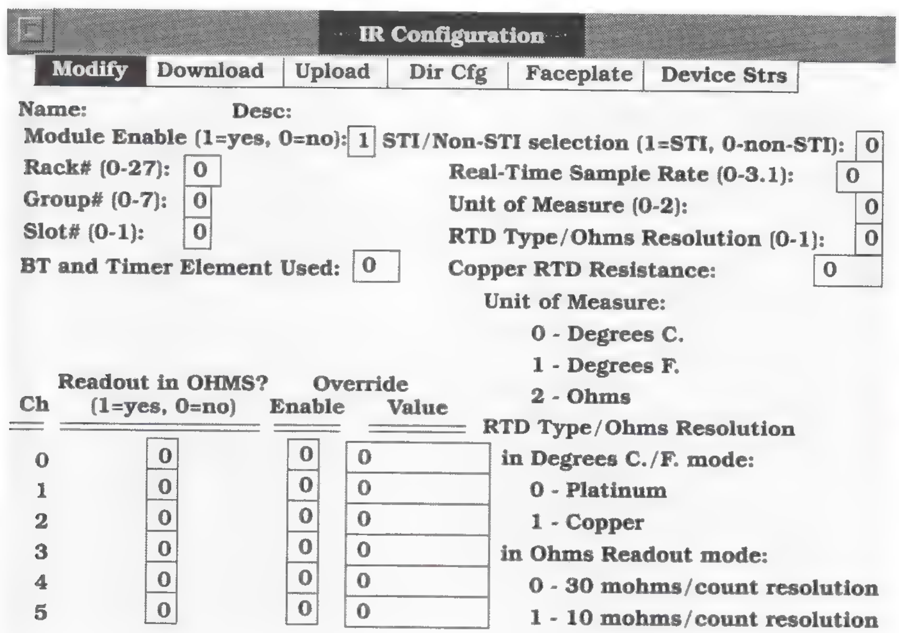
Figure 12.4
IL Function Configuration Screen



Configuring IR Functions

Figure 12.5 shows the configuration screen for an IR function. Using completed worksheet 4.3, 1771-IR Assignments, as a guide, fill in the configuration screen. For descriptions of the fields on the IR Function Configuration Screen, see Table 4.C (page 4-11).

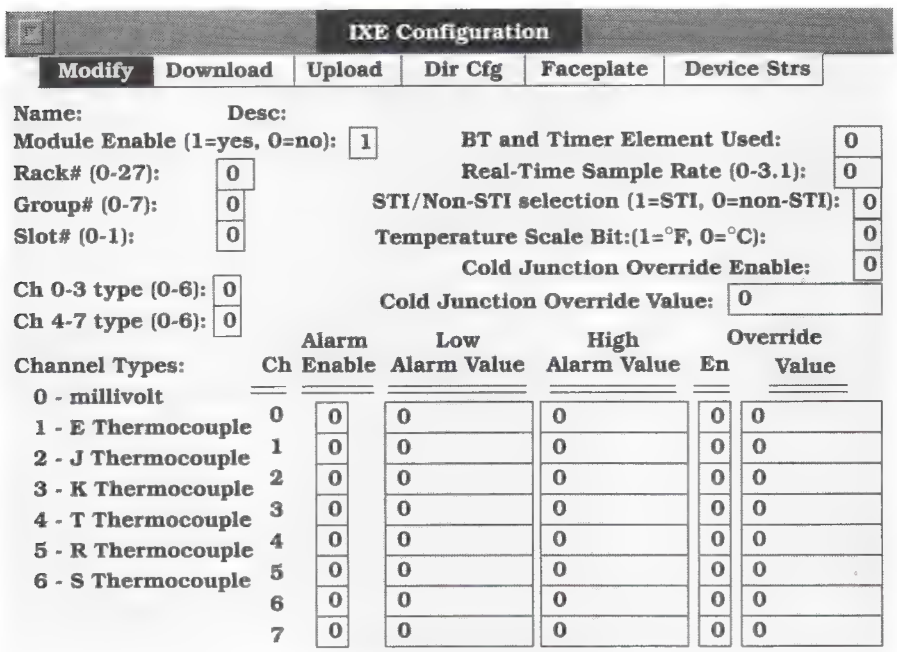
Figure 12.5
IR Function Configuration Screen



Configuring IXE Functions

Figure 12.6 shows the configuration screen for an IXE function. Using completed worksheet 4.4, 1771-IXE Assignments, as a guide, fill in the configuration screen. For descriptions of the fields on the IXE Function Configuration Screen, see Table 4.D (page 4-14).

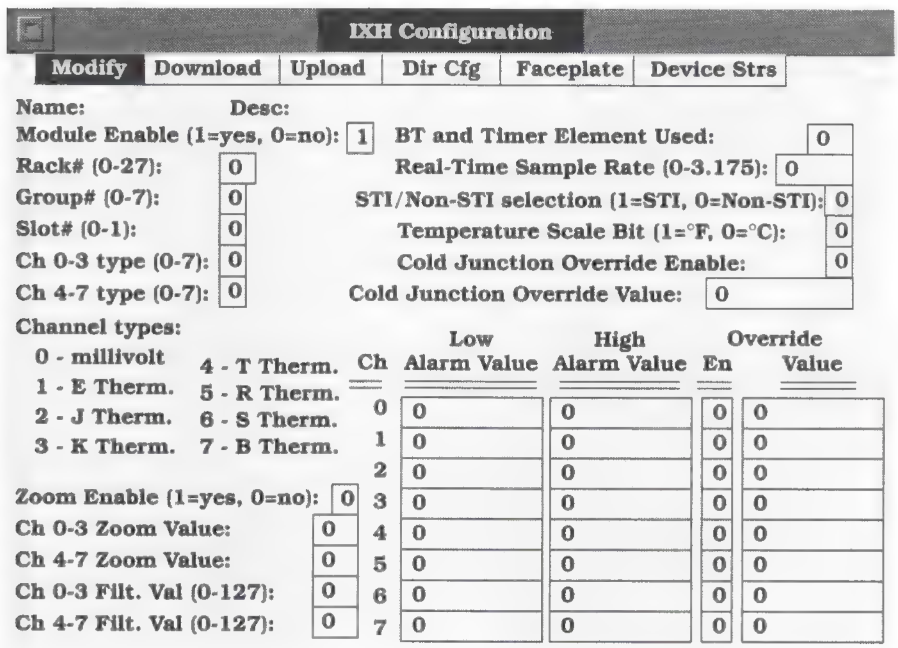
Figure 12.6
IXE Function Configuration Screen



Configuring IXHR Functions

Figure 12.7 shows the configuration screen for an IXHR function. Using completed worksheet 4.5, 1771-IXHR Assignments, as a guide, fill in the configuration screen. For descriptions of the fields on the IXHR Function Configuration Screen, see Table 4.E (page 4-17).

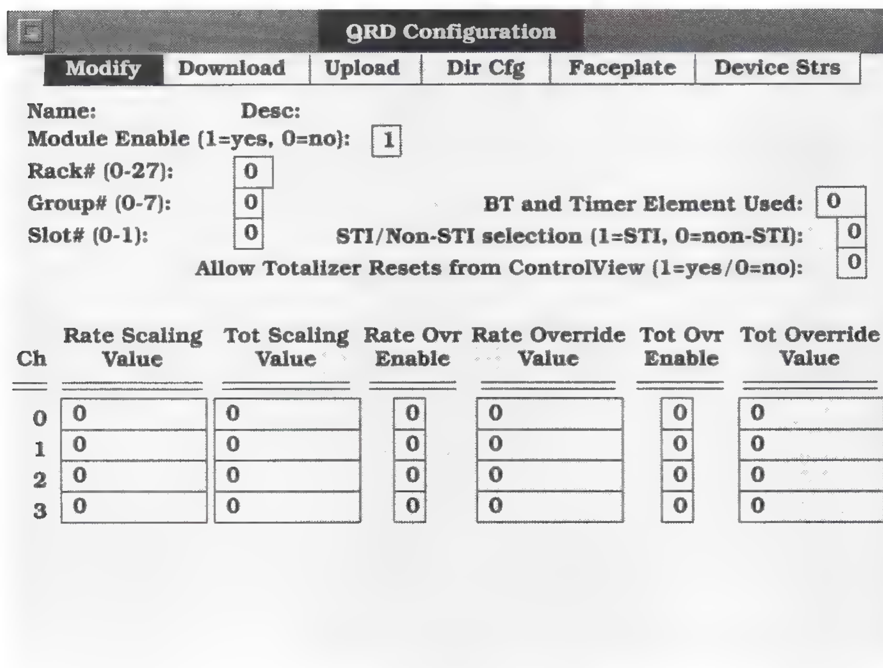
Figure 12.7
IXHR Function Configuration Screen



Configuring QRD Functions

Figure 12.8 shows the configuration screen for an QRD function. Using completed worksheet 4.6, 1771-QRD Assignments, as a guide, fill in the configuration screen. For descriptions of the fields on the QRD Function Configuration Screen, see Table 4.F (page 4-21).

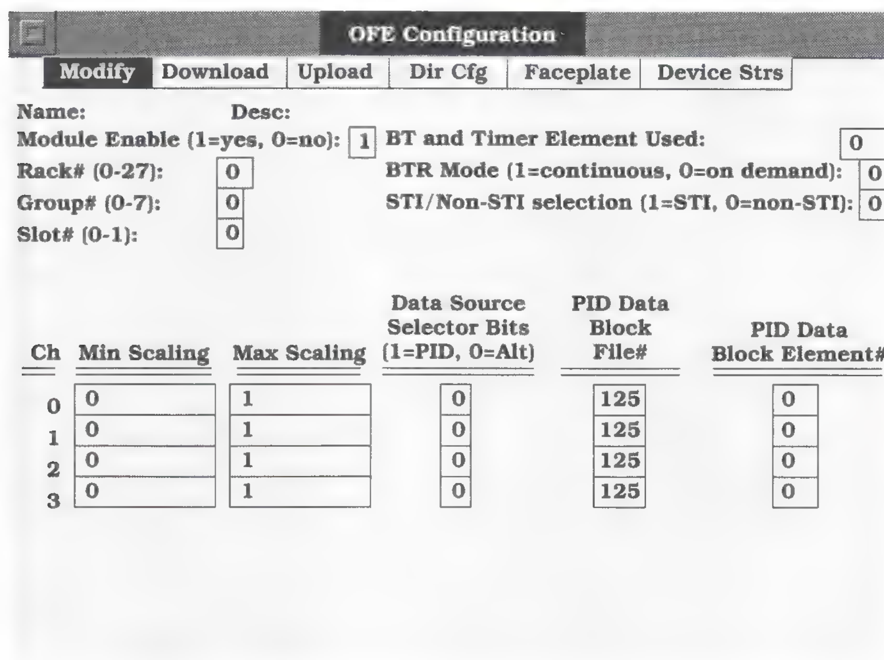
Figure 12.8
QRD Function Configuration Screen



Configuring OFE Functions

Figure 12.9 shows the configuration screen for an OFE function. Using completed worksheet 4.7, 1771-OFE Assignments, as a guide, fill in the configuration screen. For descriptions of the fields on the OFE Function Configuration Screen, see Table 4.G (page 4-24).

Figure 12.9
OFE Function Configuration Screen



Configuring N-series Functions

Figure 12.10 shows the main configuration screen for N-series functions. Figure 12.11 through Figure 12.15 show the screens for each type of input and output supported. Using completed worksheet 4.8, N-series Assignments, as a guide, fill in the appropriate configuration screens. For descriptions of the fields on the configuration screens, see Table 4.H (page 4-28).

After you have filled in the fields on the main screen, select `Configure Channel 0-7` in turn to complete the secondary screen approriate for each channel type.

Figure 12.10
N-Series Main Configuration Screen

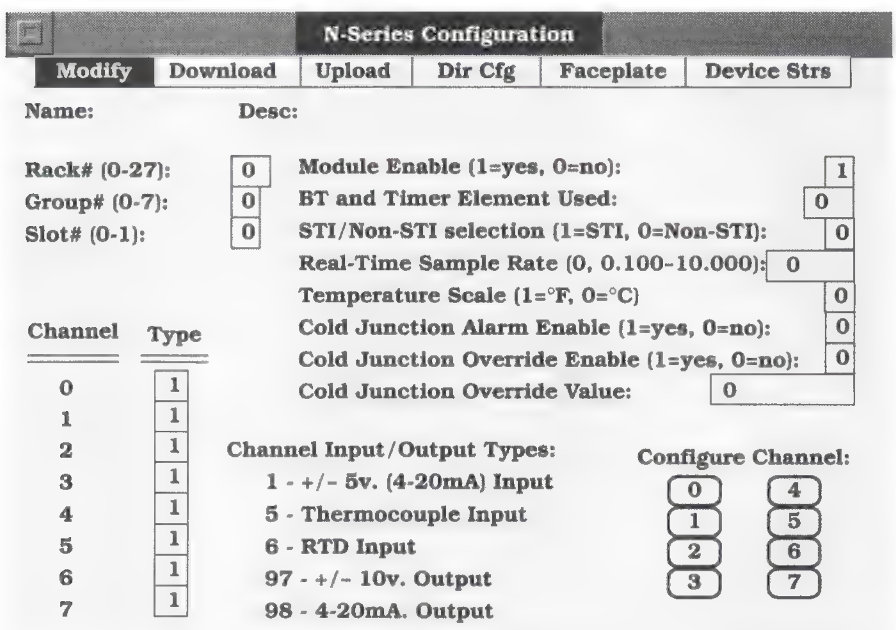


Figure 12.11
N-Series ±5 Volt Input Configuration Screen

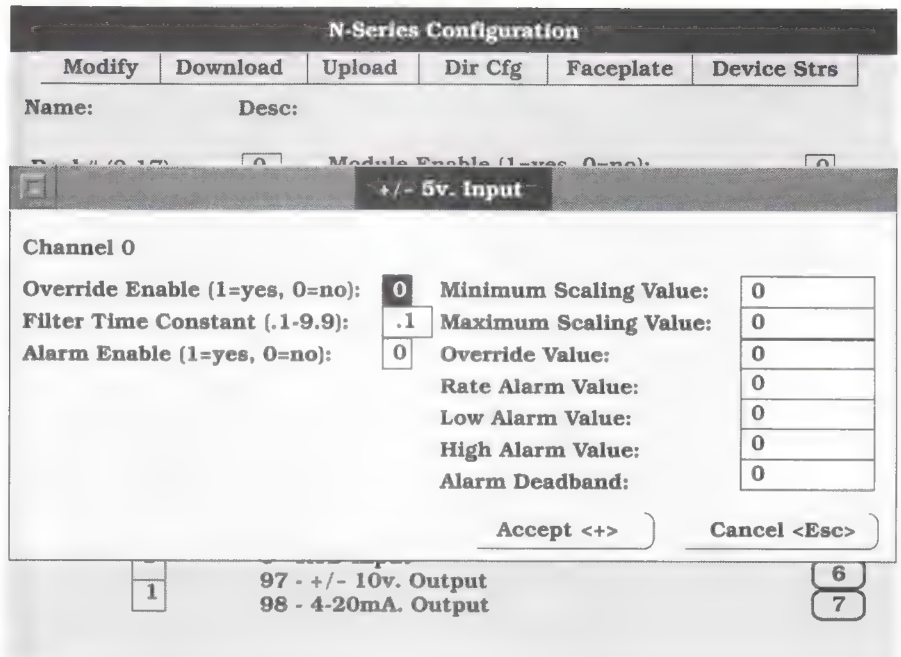


Figure 12.12
N-Series RTD Input Configuration Screen

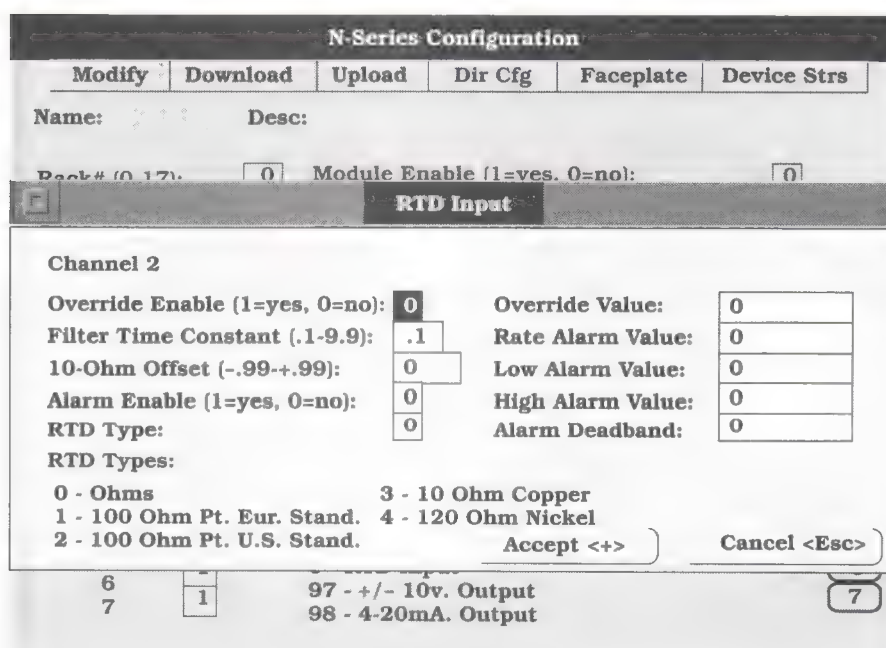


Figure 12.13
N-Series Thermocouple Input Configuration Screen

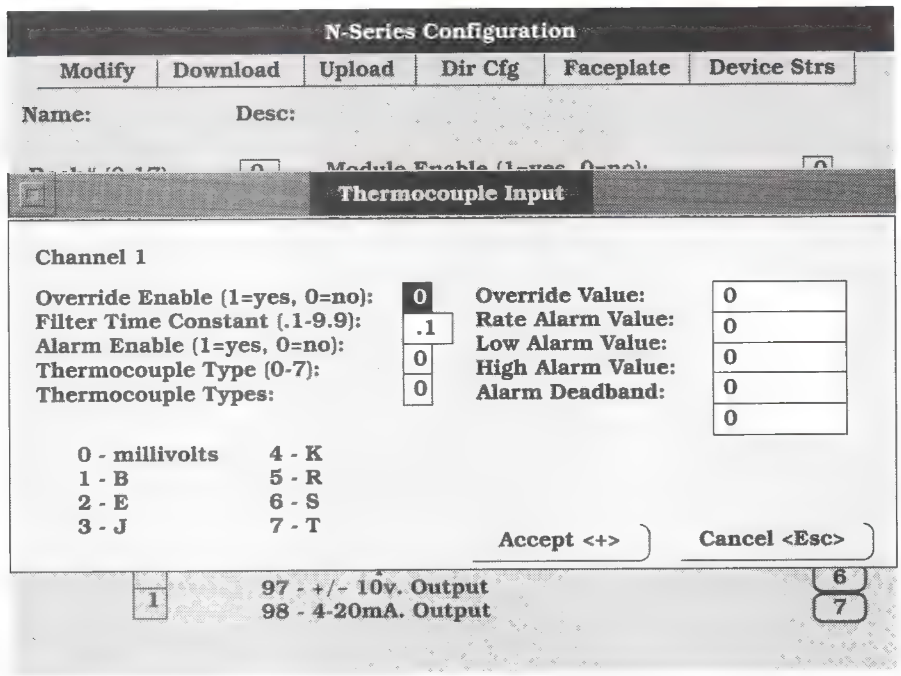


Figure 12.14
N-Series Analog Output Voltage Configuration Screen

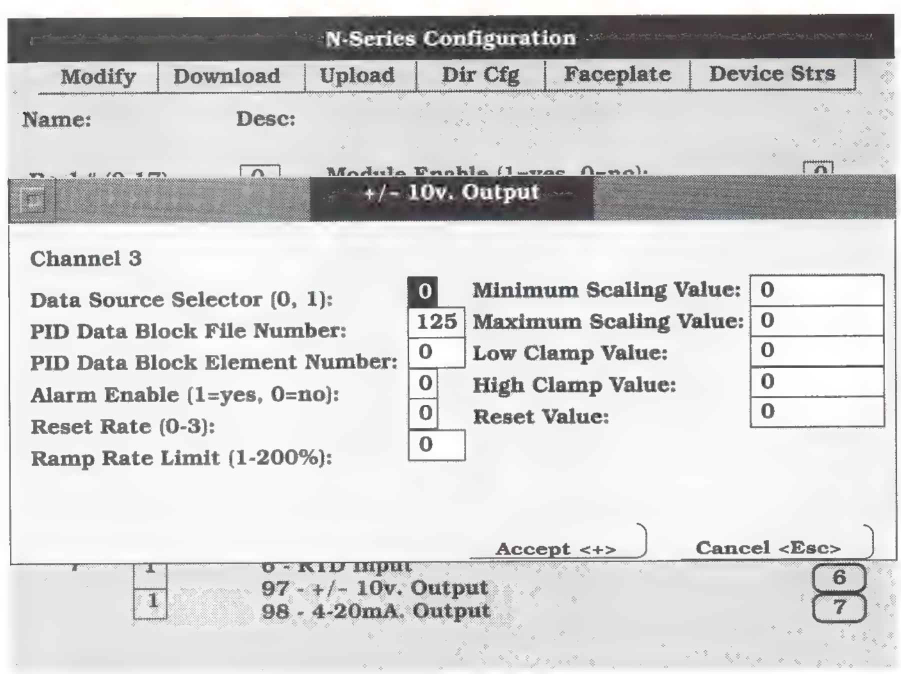
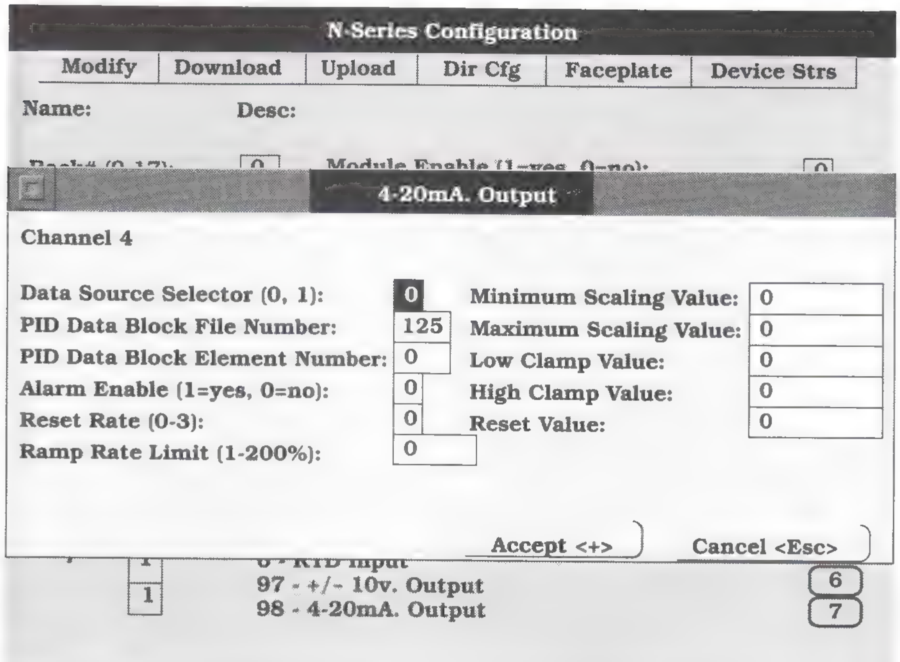


Figure 12.15
N-Series Analog Current Output Configuration Screen



What To Do Next

After you have configured your Analog I/O functions:

If you want to configure:	Go to:
Device drivers	chapter 13, "Configuring Device-Driver Functions"
Custom screens	chapter 14, "Creating Custom Screens with the PCO Symbol Library and Mouse-GRAFIX"
PanelView	chapter 15, "Configuring PCO PanelView Functions"

When you have configured everything you need for your system, read section 5 to learn how to operate and monitor your system.

Chapter 13

Configuring Device-Driver Functions

Chapter Objectives

You configure device-driver functions for two-state and three-state I/O devices by using ControlView and PCO software.

This chapter describes:

- prerequisities for configuring device-driver functions
- how to access the device-driver configuration screens
- how to configure device driver functions

Database Tags

Refer to Table A.K and Table A.L in appendix A for descriptions of the ControlView tags available for two-state and three-state device-driver functions.

Prerequisites

Before you can configure device-driver functions for two-state and three-state devices, you must do the following:

- create the necessary data files for each device in the PLC-5 processor data table
- be logged on to ControlView
- clone the ControlView tag database to create a group of tags for each device
- load the tag database
- start Alarming to enable configuration alarms

Refer to chapter 10 for procedures to perform these tasks.

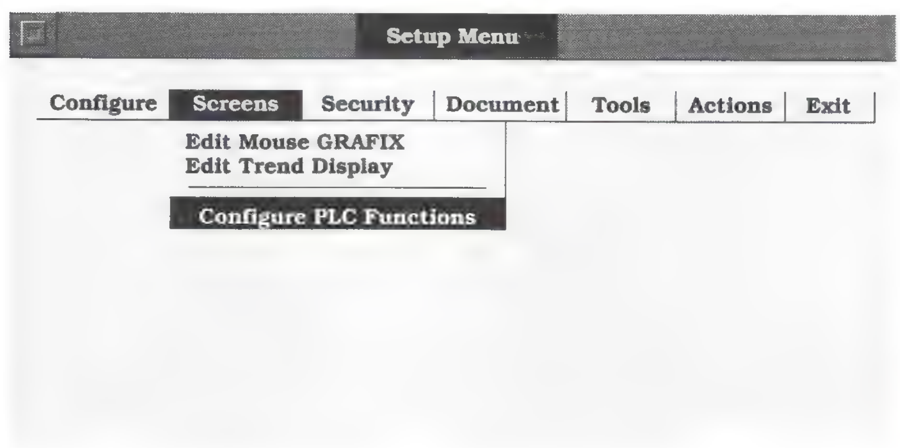
Access the Configuration Screens

To access the device-driver function configuration screens, do the following:

1. Start on the ControlView Setup Menu screen.

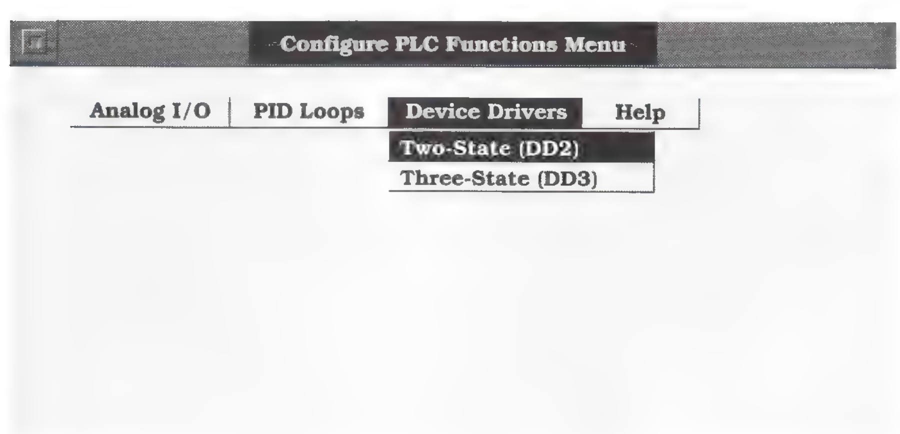
2. Select `Configure PLC Functions` under `Screens` (Figure 13.1).

Figure 13.1
Setup Menu Screen



3. Select either `Two-State (DD2)` or `Three-State (DD3)` under `Device Drivers` (Figure 13.2).

Figure 13.2
Configure PLC Functions Menu Screen



4. Select a device to configure from the list that appears and press `[Enter]`

Important: The PLC-5 addressing scheme uses octal notation for numbering I/O circuits; and, the addresses, which appear on the I/O modules, are expressed in octal. On the two-state and three-state device-driver configuration screens, however, you must enter the I/O circuit numbers in decimal notation. For your convenience, Table 13.A shows how to convert I/O circuit numbers from octal to decimal notation.

Table 13.A
Converting I/O Circuit Numbers

Octal numbering of digital I/O within an I/O group as per PLC-5 addressing:	Decimal numbering of digital I/O within an I/O group as per device driver configuration screen:
00	00
01	01
02	02
03	03
04	04
05	05
06	06
07	07
10	08
11	09
12	10
13	11
14	12
15	13
16	14
17	15

Configure Device-Driver Functions

There are two different device-driver functions, one for two-state devices and another for three-state devices. Although each has its own configuration screen, the procedures for configuring both are very similar.

To configure a digital I/O device-driver function, do the following:

1. Start on the appropriate device-driver configuration screen.
2. Select `Modify`
3. Select a field to edit. Use the cursor keys or the mouse to select the field.
4. Type the new data and press **`[Enter]`**
5. When you are finished editing fields, press **`[Esc]`** to return to the menu.

6. Perform a PLC or File Download, or both to save the changes.

   When you perform the download, all values are checked for validity. If any value is invalid, it will be highlighted in red and an error message will be displayed. Because of the relationships between the configuration values, it is possible for one field to show an error that is really due to an error in another field. When this occurs, select and correct the erroneous field. All fields must contain valid entries, even if they are not applicable to your application.

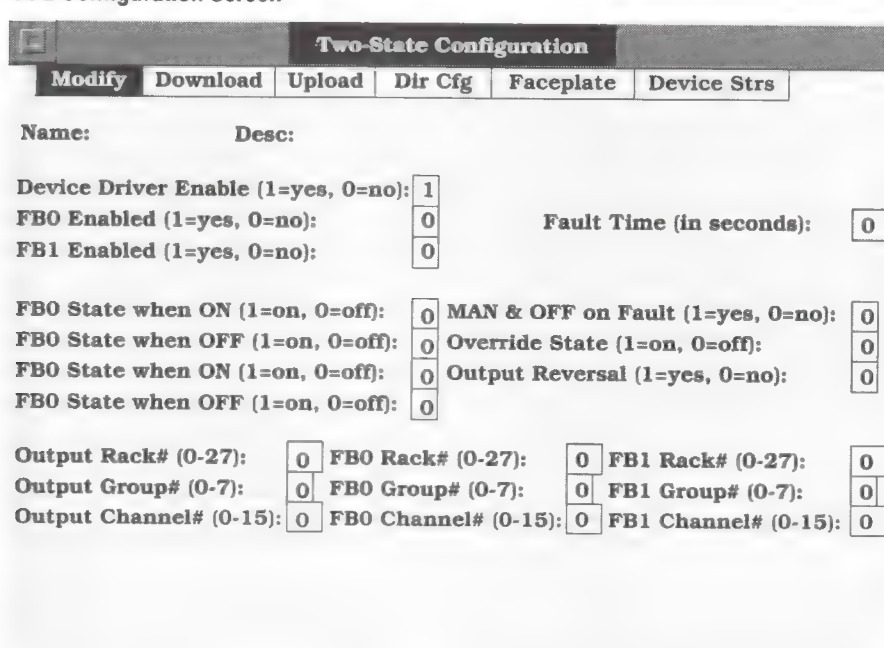
   Once you have corrected the error, you must select a download function again.

7. Once you have downloaded the configuration for the current structure, you can press `[Esc]` to select another structure of the current type, or you can select `Device Strs` to change to a different function type.

Configure Two-State Device-Driver Functions

Figure 13.3 shows the configuration screen for a two-state device-driver function. Using completed worksheet 5.1, DD2 Assignments, as a guide, fill in the configuration screen. For descriptions of the fields, see Table 5.A (page 5-3).

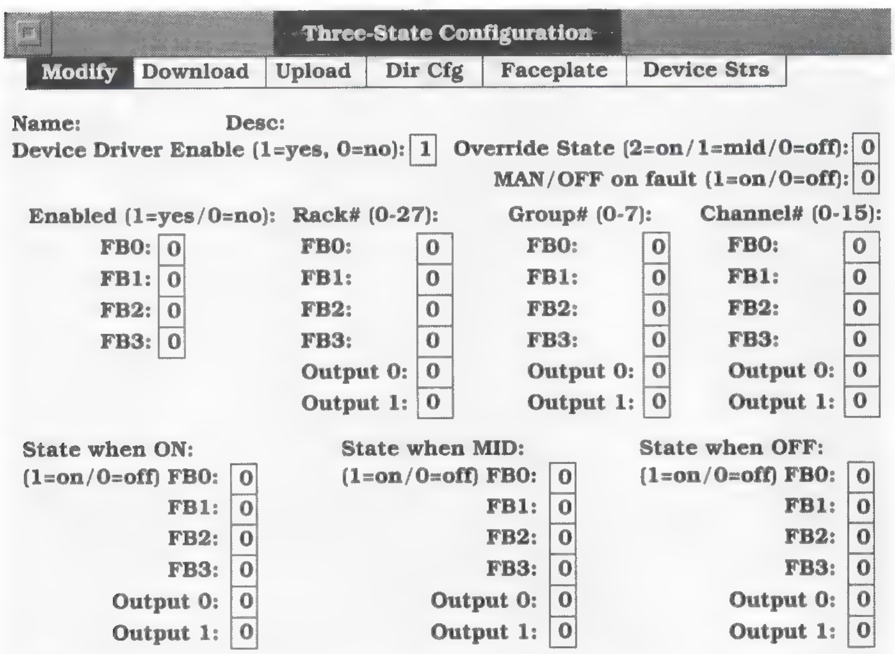
Figure 13.3
DD2 Configuration Screen



Configure Three-State Device-Driver Functions

Figure 13.4 shows the configuration screen for a three-state device-driver function. Using completed worksheet 5.2 DD3 Assignments, as a guide, fill in the configuration screen. For descriptions of the fields, see Table 5.B (page 5-6).

Figure 13.4
DD3 Configuration Screen



What To Do Next

After you have configured your device-driver functions:

If you want to configure:	Go to:
Custom screens	chapter 14, “Creating Custom Screens with the PCO Symbol Library and Mouse-GRAFIX”
PanelView	chapter 15, “Configuring PCO PanelView Functions”

When you have configured everything you need for your system, read section 5 to learn how to operate and monitor your system.

Chapter 14

Creating Custom Screens with the PCO Symbol Library and Mouse-GRAFIX

Chapter Objectives

You can use the symbol library supplied with PCO to configure graphic representations of your equipment. This chapter explains:

- graphic options
- accessing the library
- using the library
- closing symbol files
- creating custom graphics

Prerequisites

To use the PCO symbol library to create ControlView graphics screens you need to have:

- the ControlView Mouse-GRAFIX Editor option installed
- the PCO symbol library installed

Important: During the PCO installation process, you were prompted to install the PCO graphic library. If you chose to install it, the symbol files were copied to directory \access\mgx\lib. If you chose not to install it at that time, but now want to use it, you must install it first.

Graphic Options

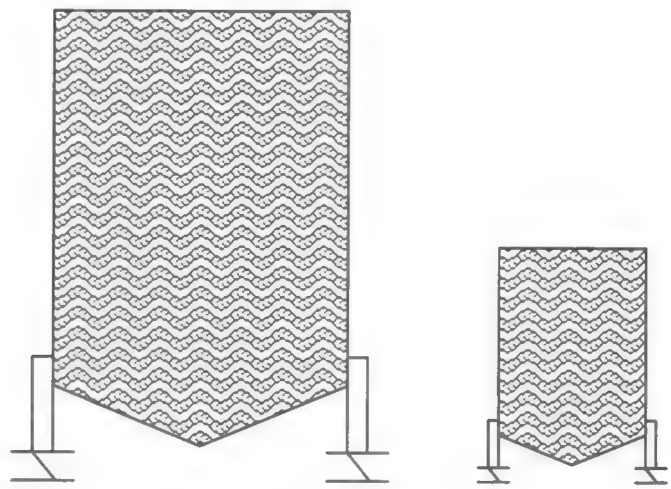
There are five files in the symbol library supplied with PCO:

- Tanks
- Valves
- Motors
- Pumps
- Heat Exchangers

Tank Symbols

Figure 14.1 shows the symbols available in the tank symbol library file.

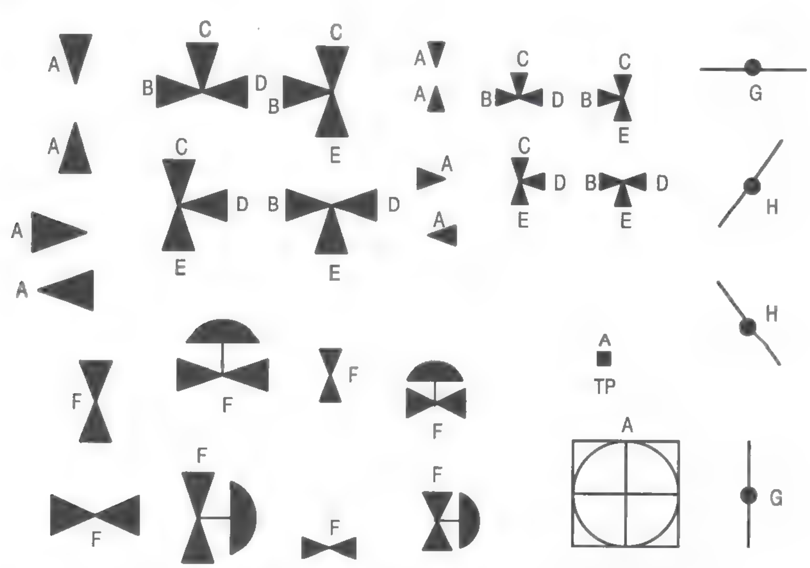
Figure 14.1
PCO Tank Symbols



Valve Symbols

Figure 14.2 shows the symbols available in the valve symbol library file.

Figure 14.2
PCO Valve Symbols

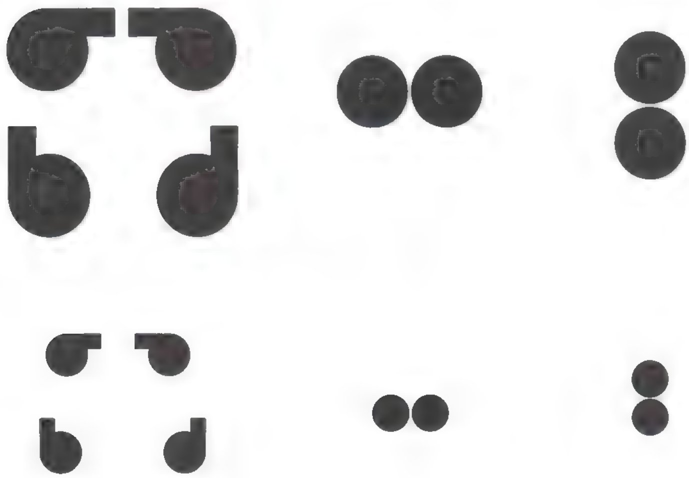


NOTE: Letters refer to control elements described in Table 14.A and are not part of symbols.

Pump Symbols

Figure 14.3 shows the symbols available in the pump symbol library file.

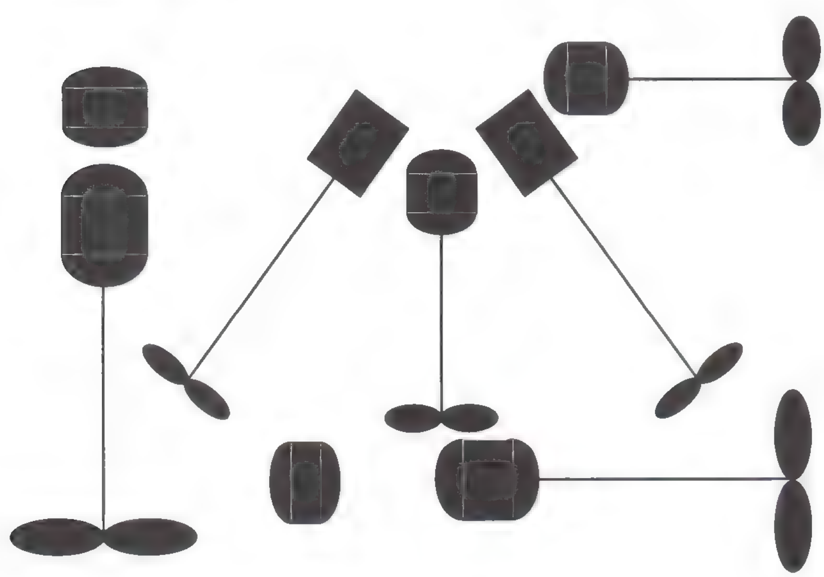
Figure 14.3
PCO Pump Symbols



Motor Symbols

Figure 14.4 shows the symbols available in the motor symbol library file.

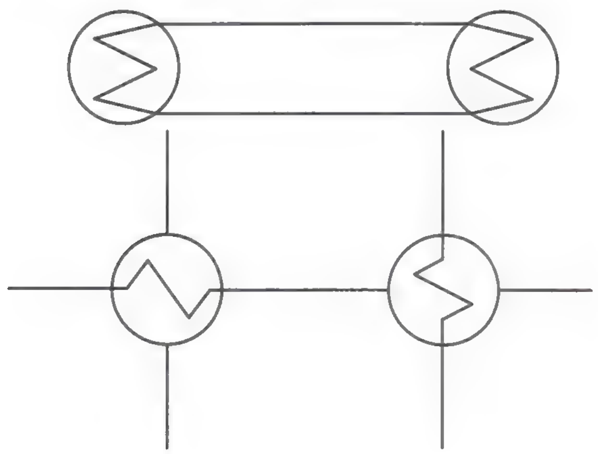
Figure 14.4
PCO Motor Symbols



Heat Exchanger Symbols

Figure 14.5 shows the symbols available in the heat exchanger symbol library file.

Figure 14.5
PCO Heat Exchanger Symbols



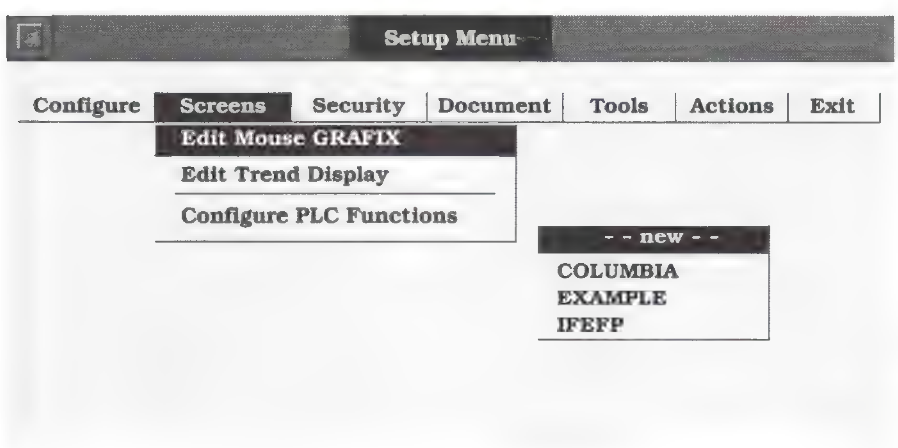
Accessing the Library

To access the PCO symbol library, do the following:

1. Start on the Setup Menu screen.

2. Select `Edit Mouse GRAFIX` under `Screens` (Figure 14.6).

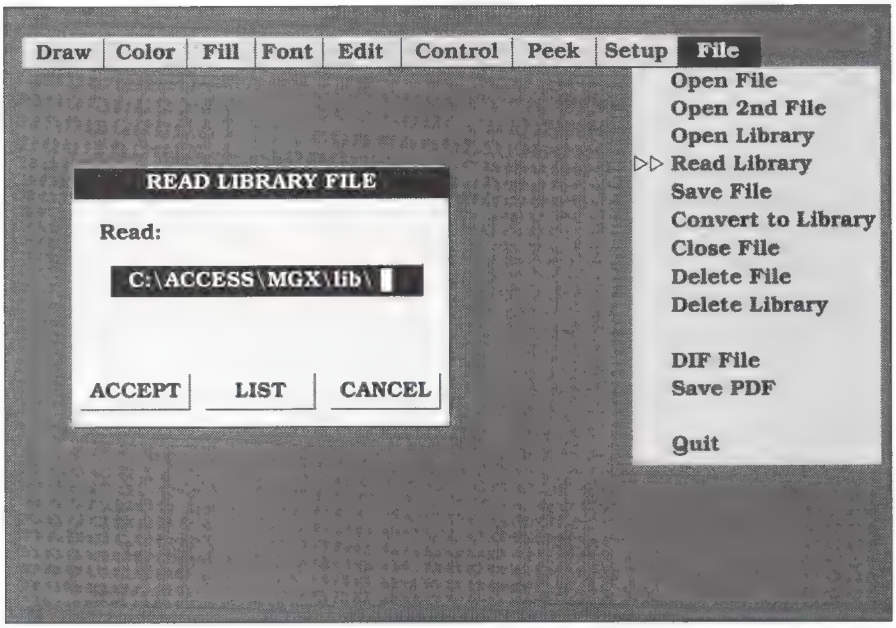
Figure 14.6
Select Mouse GRAFIX Sceen



3. Select either the file you want to edit or `New` from the list that appears.

4. Select `Read Library` under `File` from the graphics editor screen (Figure 14.7).

Figure 14.7
Select Read Library



5. Select `LIST` in the Read Library File window to display a list of available symbol files.

6. Select one of the symbol files from the list.

Using the Library

If you have experience using other ControlView symbol libraries, you already know how to use the PCO symbol library; the features and operations are the same.

If you are not familiar with the library feature of the Mouse-GRAFIX editor, you should read the ControlView Mouse-GRAFIX Editor User Manual (publication 6190-6.5.3) before attempting to use the graphics editor.

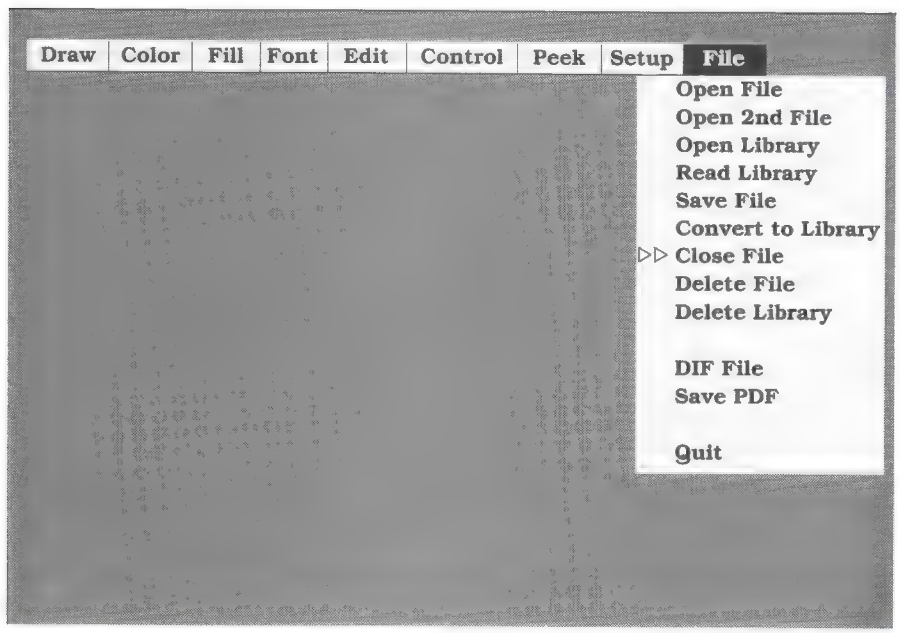
Closing Symbol Files

When you are finished using a symbol file, do the following.

1. Make the symbol file active, i.e. the white border must surround the symbols in the library file.

2. Select `Close File` under `File` on the graphics editor screen (Figure 14.8).

Figure 14.8
Select Close File



Creating Custom Graphics

Most symbols have a controlled element associated with them. Table 14.A describes the type of element associated with the symbols in each file of the PCO symbol library and identifies the default tag name assigned to each symbol.

Table 14.A
PCO Symbol Library

File name:	Default tag name:	Type:[1]	Description:
Tanks	#1.LEVEL	A	Display a variable fill level.
Valves	#1.LT	D	Determines whether items marked B in Figure 14.2 are red or green. An item is red when the tag is true and green when it is false.
	#1.TOP	D	Determines whether items marked C in Figure 14.2 are red or green. An item is red when the tag is true and green when it is false.
	#1.RT	D	Determines whether items marked D in Figure 14.2 are red or green. An item is red when the tag is true and green when it is false.
	#1.BOT	D	Determines whether items marked E in Figure 14.2 are red or green. An item is red when the tag is true and green when it is false.
	#1.ON #1.OFF	D D	These two tags determine the color of items marked F in Figure 14.2 An item is green when tag #1.ON is true, red if tag #1.OFF is true, and yellow otherwise.
	#1.CLOSED	D	Items marked G in Figure 14.2 are visible when this tag is true and invisible when it is false.
	#1.OPEN	D	Items marked H in Figure 14.2 are visible when this tag is true and invisible when it is false.
Pumps	#1.PUMP	D	Determines the color of pumps. A pump is red when this tag is true or green when it is false.
Motors	#1.MOTOR	D	Determines the color of a motor body, shaft, and blade. An item is red when this tag is true and green when it is false.
Heat Exchangers	#1.HEAT #1.COOL	D D	These two tags determine the color of the body of heat exchangers. The body is red when tag #1.HEAT is true, blue when tag #1.COOL is true, or clear otherwise.

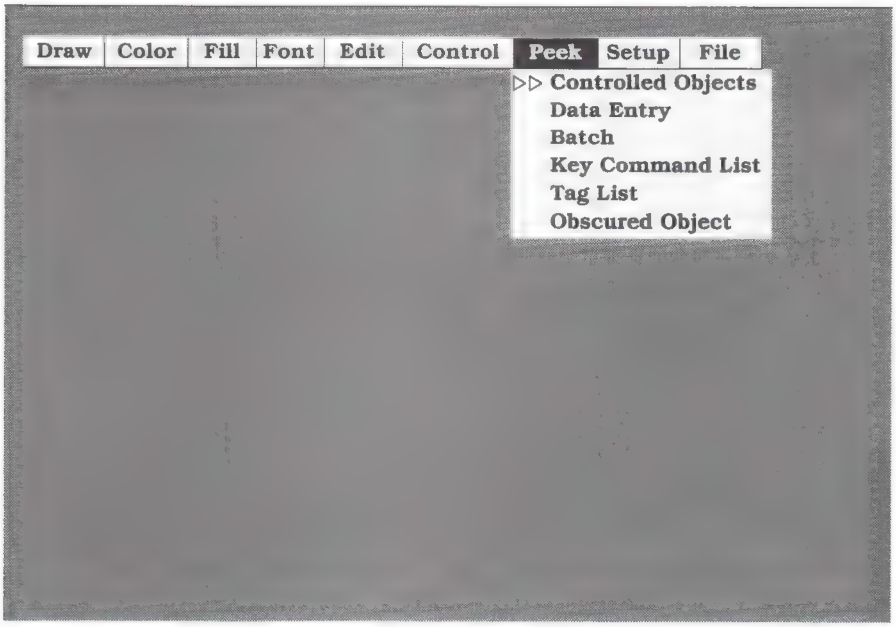
[1] A(analog); D(digital)

Before you can use a control expression, edit the symbol so that it references the desired tag. To edit a symbol to include a control expression, do the following:

1. Copy the tag onto your graphic screen.
2. Select the symbol (ungroup it if necessary).
3. Select the green portion.

4. Using `Controlled Objects` under `Peek` on the graphics editor screen, view the control (Figure 14.9).

Figure 14.9
Select Controlled Objects



5. Select `Editor` to change or view the expression.

Important: Although the defaults use an indirect tag reference, i.e., #1, you may need to replace this with a specific tag name depending on your application.

What To Do Next

After you have created your custom screens, if you want to configure PanelView functions, continue with chapter 15.

When you have configured everything you need for your system, read section 5 to learn how to operate and monitor your system.

Chapter 15

Configuring PCO PanelView Functions

Chapter Objectives

This chapter explains how to configure PanelView Operator Interface terminals for use with PCO software. This chapter assumes you are already familiar with the PanelView and PanelBuilder software.

Prerequisites

Before you can configure the PCO PanelView functions, you must do the following:

- Use a keypad PanelView terminal. You cannot use a touch screen PanelView terminal.
- Use PDS (PanelView Development Software) to download the PCO screens to the PanelView terminal. The filename is pcopv212.cfg
- Include a JSR to file 45 in your main program (55) to activate the PCO PanelView functions. (Do not use a UID instruction.)
- The PCO PanelView function configures the PanelView terminal to use racks 6 and 7.
- Have created the PID data table files as described in chapter 10 and configured the PID loops as described in chapter 11.

Access the Configuration Screen

To access the PCO PanelView configuration screen, do the following:

1. Start on any PCO PanelView faceplate screen.
2. Press **[CONFIG SCREEN]** on the PanelView terminal to access the configuration screen.

ATTENTION: The PCO PanelView functions use the integer file number and starting element offset you configure to identify the correct data to display. If you configure a file number that does not exist, the PLC processor will fault when you try to display that loop.

To prevent this, follow this procedure:

1. Make certain that all the data tables defined for the loops you wish to monitor with PanelView are in sequential order. For example, if you have 4 loops you wish to monitor, you might create the following data table files for them:

   N200
   F201
   N202
   F203
   N204
   F205
   N206
   F207

2. Using 6200 software, modify the contents of N122:62 to be equal to the lowest integer file number you wish to monitor (200 in the above example).
3. Using 6200 software, modify the contents of N122:63 to be equal to the highest integer file number you wish to monitor (206 in the above example).
4. If you cannot place the data table files in sequence, make certain that every file number in the range between the value in N122:62 and N122:63 exists, even if it is only one element in length. This will prevent the PLC processor from faulting as described above.

Configure PCO PanelView Functions

To display the loop name and engineering units, those parameters must be stored in file N119 of the PLC data table.

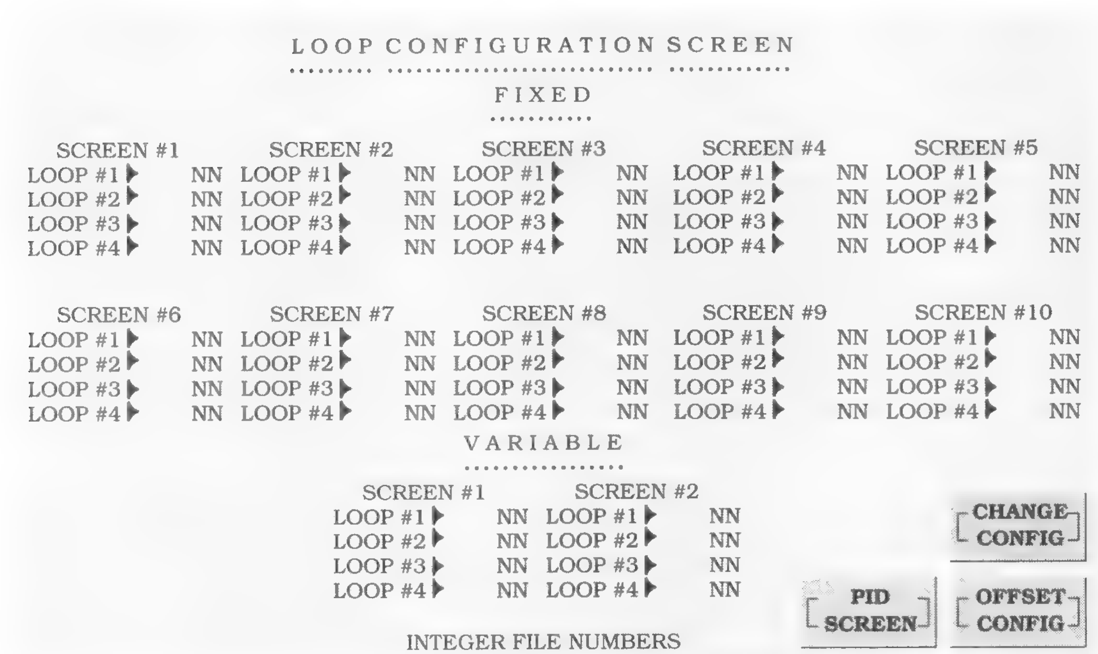
File N119 has an 11-word block for each of the 48 loops you can display. The first loop uses words 0 through 10 inclusive, the second loop uses words 11 through 22, and so on.

In each block, the first two words are reserved. The next 5 words hold the loop name (ten characters total, two in each word). The last 4 words hold the process variable engineering units (eight characters total, two in each word). If you have not already done so, enter these parameters into file N119 using 6200-series programming software.

The PCO PanelView configuration screen has two pages. You can press **[PID SCREEN]** on either page to display PCO PID loop faceplate screens.

The first page of the configuration screen (Figure 15.1) is the integer file number screen. On this screen you enter the integer file number for every loop on all PCO faceplate screens. See completed worksheet 3.1, PID Loop Assignments, for the integer file numbers to use.

Figure 15.1
PCO PanelView Configuration Screen, Page 1



To enter or modify integer file numbers, do the following:

1. Start on page 1 of the configuration screen (labeled "Integer File Numbers" at the bottom).

2. Press **[SELECT]**

   A cursor (small arrow) appears next to one of the entry fields.

3. Using the arrow keys, move the cursor to the desired field.

4. Press **[CHANGE CONFIG]**

   The data entry window appears with the prompt: `Enter new value or press cancel.`

5. Enter the desired integer file number (or press **[CANCEL]** to abort entry) and press **[ENTER]**. The data entry window remains on the screen. Move the cursor to another field and enter or modify that integer file number. Press **[ENTER]** after entering each value. Continue until you have entered all of the integer file numbers.

6. After entering integer file numbers, press **[CANCEL]** to close the data entry window. Then, press **[OFFSET CONFIG]** to display the second page of the configuration screen.

The second page (Figure 15.2) is the starting word offset screen. On this screen you enter the starting word offset for every loop on all PCO faceplate screens. See the completed PID worksheets for the starting word offsets to use.

Figure 15.2
PCO PanelView Configuration Screen, Page 2

LOOP CONFIGURATION SCREEN

FIXED

SCREEN #1		SCREEN #2		SCREEN #3		SCREEN #4		SCREEN #5	
LOOP #1 ▶	NN	LOOP #1 ▶	NN	LOOP #1 ▶	NN	LOOP #1 ▶	NN	LOOP #1 ▶	NN
LOOP #2 ▶	NN	LOOP #2 ▶	NN	LOOP #2 ▶	NN	LOOP #2 ▶	NN	LOOP #2 ▶	NN
LOOP #3 ▶	NN	LOOP #3 ▶	NN	LOOP #3 ▶	NN	LOOP #3 ▶	NN	LOOP #3 ▶	NN
LOOP #4 ▶	NN	LOOP #4 ▶	NN	LOOP #4 ▶	NN	LOOP #4 ▶	NN	LOOP #4 ▶	NN

SCREEN #6		SCREEN #7		SCREEN #8		SCREEN #9		SCREEN #10	
LOOP #1 ▶	NN	LOOP #1 ▶	NN	LOOP #1 ▶	NN	LOOP #1 ▶	NN	LOOP #1 ▶	NN
LOOP #2 ▶	NN	LOOP #2 ▶	NN	LOOP #2 ▶	NN	LOOP #2 ▶	NN	LOOP #2 ▶	NN
LOOP #3 ▶	NN	LOOP #3 ▶	NN	LOOP #3 ▶	NN	LOOP #3 ▶	NN	LOOP #3 ▶	NN
LOOP #4 ▶	NN	LOOP #4 ▶	NN	LOOP #4 ▶	NN	LOOP #4 ▶	NN	LOOP #4 ▶	NN

VARIABLE

SCREEN #1		SCREEN #2	
LOOP #1 ▶	NN	LOOP #1 ▶	NN
LOOP #2 ▶	NN	LOOP #2 ▶	NN
LOOP #3 ▶	NN	LOOP #3 ▶	NN
LOOP #4 ▶	NN	LOOP #4 ▶	NN

STARTING WORD OFFSET

[CHANGE CONFIG] [PID SCREEN] [OFFSET CONFIG]

To enter or modify starting word offsets, do the following:

1. Start on page 2 of the configuration screen (labeled "Starting Word Offset" at the bottom).

2. Press **[SELECT]**

   A cursor (small arrow) appears next to one of the entry fields.

3. Using the arrow keys, move the cursor to the desired field.

4. Press **[CHANGE CONFIG]**

   The data entry window appears with the prompt: `Enter new value or press cancel.`

5. Enter the desired starting word offset (or press **[CANCEL]** to abort entry) and press **[ENTER]**. The data entry window remains on the screen. Move the cursor to another field and enter or modify that starting address word offset. Press **[ENTER]** after entering each value. Continue until you have entered all of the starting word offsets.

6. After entering starting word offsets, press **[CANCEL]** to close the data entry window. Then, press **[FILE CONFIG]** to display the first page of the configuration screen or press **[PID SCREEN]** to return to the PCO faceplate screen.

What To Do Next

Once you have configured the PCO PanelView faceplates, you can monitor the process using a PanelView Operator Interface terminal. For more information about using PCO PanelView functions, see chapter 16, "Monitoring PID Loops."

Chapter 16

Monitoring PID Loops

Chapter Objectives

There are two ways to monitor PID loops:

- using PCO faceplates
- using PanelView functions

This chapter describes both methods.

Monitoring PID Loops using PCO Faceplates

PCO provides faceplates for the PID function. PID faceplates are Mouse-GRAFIX screens that let you monitor and tune regulatory loops from the ControlView environment.

Because PID faceplates are Mouse-GRAFIX screens, you must have the Mouse-GRAFIX option (6190-MGX) installed if you wish to customize them.

Accessing PID Loop Faceplates

The method you use to display PID faceplates depends on where you are in the software. Table 16.A lists the methods available.

Table 16.A
Accessing PCO PID Faceplates

To access the faceplate from the:	Do this:
PCO device structures menu screen	select "Faceplate" from the menu bar.
PCO PID configuration screen	select "Faceplate" from the menu bar.
ControlView	1. press [Alt-C] to bring up the ControlView command line 2. type DISPLAY PIDFP /T*tagname* 3. press [Enter]
Batch/Process keyboard	press the key, if one has been defined, dedicated to the particular device you want to monitor (these keys must be assigned and programmed by your system programmer).

Monitor PID Loops

Every regulatory loop configured has a unique faceplate. To use a faceplate, do the following:

1. Access the PID Loop Faceplate for the loop desired.

2. View PID loop operation. Figure 16.1 shows a sample PID faceplate. Table 16.B describes each of the fields on the faceplate.

Figure 16.1
Sample Faceplate for a PID Loop

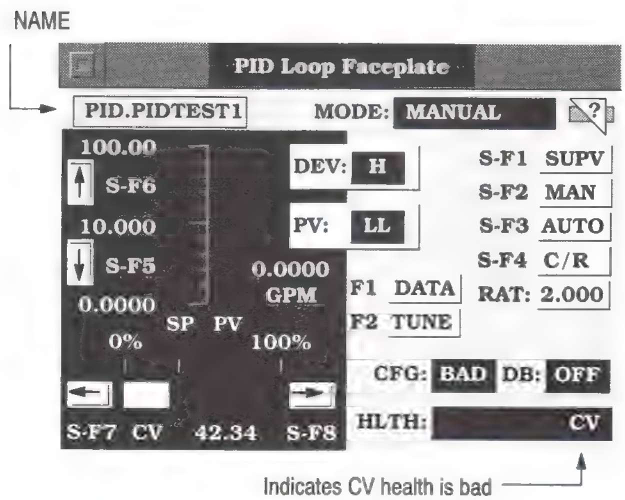


Table 16.B
Field Descriptions for PID Loop Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
MODE	the current operating mode. If desired, you can change the operating mode by clicking the buttons or pressing [Shift-F1], [Shift-F2] and/or [Shift-F3] or [Shift-F4].
DEV:	the current status of the deviation alarm.
PV:	the current status of the process variable alarm.
SP	the current setpoint value and limits. If desired, you can change the setpoint by clicking the buttons or pressing [Shift-F6] to increase SP and/or [Shift-F5] to decrease SP.
PV	the current PV value and units.
CV	the current control variable value and limits. If desired, you can change the control variable by clicking the buttons or pressing [Shift-F7] to decrease CV and/or [Shift-F8] to increase it when in manual mode.
CFG	the status of the loop configuration alarm.
DB	the status of the deadband.
HLTH	the current health of the PV, TB, CV, and Ratio input.
DATA	that to access the PID Data Entry faceplate either click on the button or press [F1].
TUNE	that to access the PID Tune faceplate either click on the button or press [F2].

Modifying PID Data

If you want to modify the setpoint, manual output, ratio multiplier, bias, ramp target, and/or ramp time values, perform the following steps:

1. click on the DATA button or press `[F1]` from the PID Loop faceplate.

   This causes the PID Data Entry faceplate to appear. Figure 16.2 shows a sample PID Data Entry faceplate. Table 16.C describes each of the fields on the faceplate.

2. When you are finished editing, press `[Pg Dn]` to download your changes to the PLC processor.

   You can initiate a ramp of the non-supervisory setpoint by entering ramp target and time values and clicking on ramp-on or pressing `[Shift-F1]`. Clicking on ramp-off or pressing `[Shift-F2]` will stop a ramp that is in progress.

3. Press `[Esc]` to return to the previous screen.

Figure 16.2
Sample PID Data Entry Faceplate

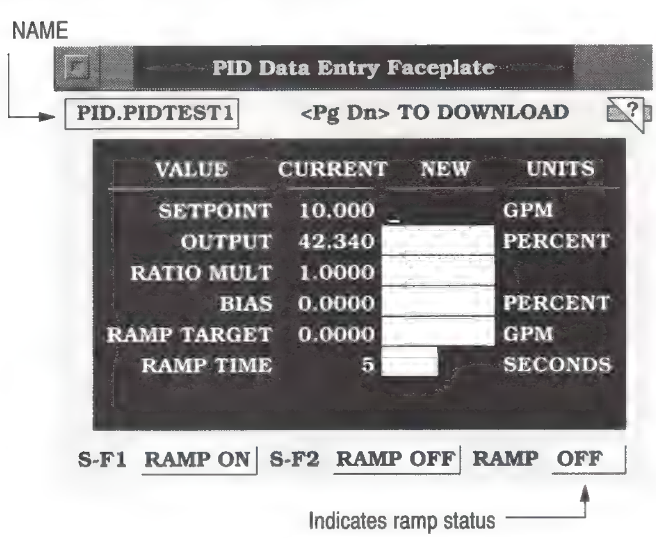


Table 16.C
Field Descriptions for PID Data Entry Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
VALUE	the names of the parameters you can change from this window.
CURRENT	the current value of the corresponding parameter.
NEW	the new value for the corresponding parameter.
UNITS	the units of measure for the corresponding parameter.

Tuning PID Parameters

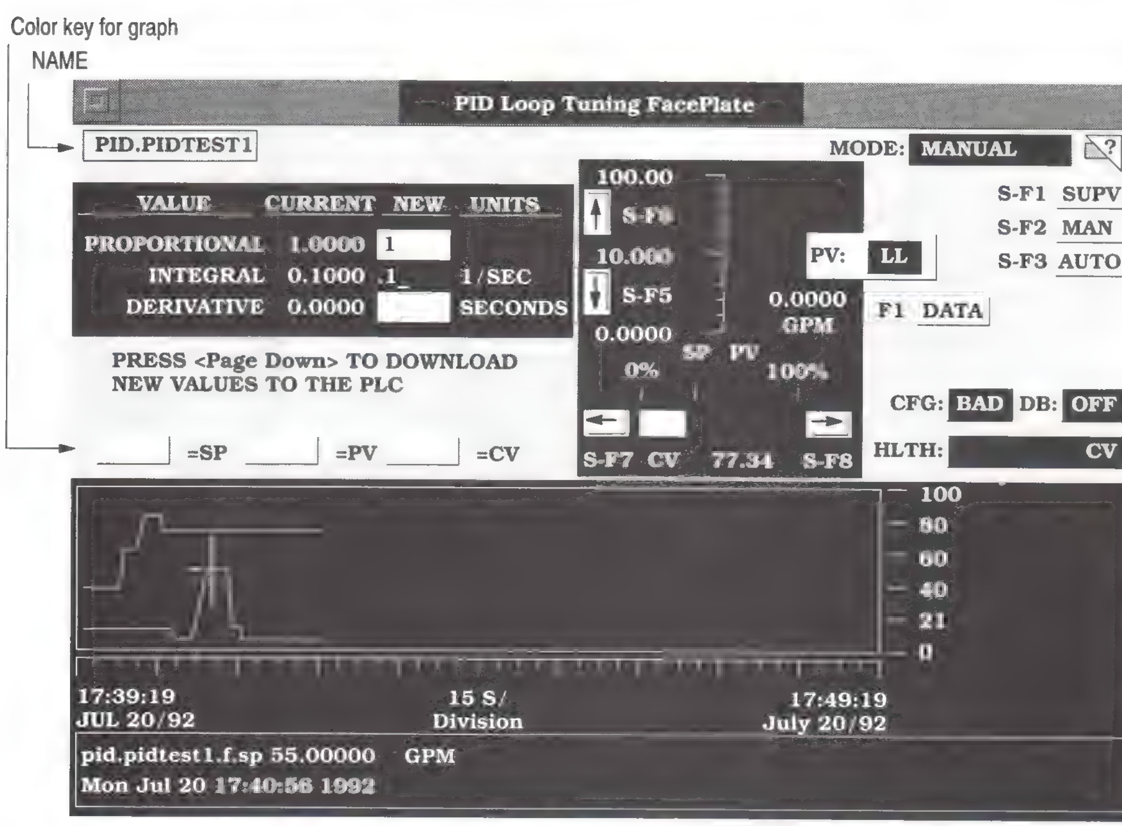
If you want to adjust the proportional gain, integral gain, and/or derivative gain, perform the following steps:

1. Click on the TUNE button or press [F2] from the PID Loop faceplate. This causes the PID Loop Tuning faceplate to appear. Figure 16.3 shows a sample PID Loop Tuning faceplate. Table 16.D describes each of the fields on the faceplate.

2. When you are finished tuning the loop, press [Pg Dn] to download your changes to the PLC processor.

3. Press [Esc] to return to the previous screen.

Figure 16.3
Sample PID Loop Tuning Faceplate



The upper right corner of this faceplate is the same as the PID Loop faceplate screen (Figure 16.1). The graph along the bottom of the tuning faceplate shows the relationship between the value of the process variable, setpoint, and control variable versus time for a 10 minute period.

Table 16.D
Field Descriptions for PID Loop Tuning Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
VALUE	the names of the loop gain parameters you can change from this window.
CURRENT	the current value of the corresponding loop gain parameter.
NEW	the new value for the corresponding loop gain parameter.
UNITS	the units of measure for the corresponding loop gain parameter.

Monitoring PID Loops Using PanelView Functions

The PanelView terminal lets you monitor and adjust loops from a remote plant floor location. Using a PanelView terminal and the PCO PanelView function, you can monitor up to 48 loops on 12 screens of 4 loops each. The following functions are available:

- Display Process Variables (PV), Setpoint (SP), Control Variable (CV) values and graphs, SP minimum and maximum, loop name, PV engineering units, mode, deadband status, and alarm status
- Change Mode, SP, CV, proportional gain, integral gain, and derivative gain

Before you can use the PCO PanelView functions, you must configure the PCO PanelView functions (see chapter 15).

Monitoring Configured Loops

There are ten fixed PCO faceplate screens (Figure 16.4) for the PanelView terminal. The screen number, which is displayed in the upper left corner, corresponds to the screen number on the PCO PanelView configuration screen.

Figure 16.4
Sample Fixed Faceplate Screen

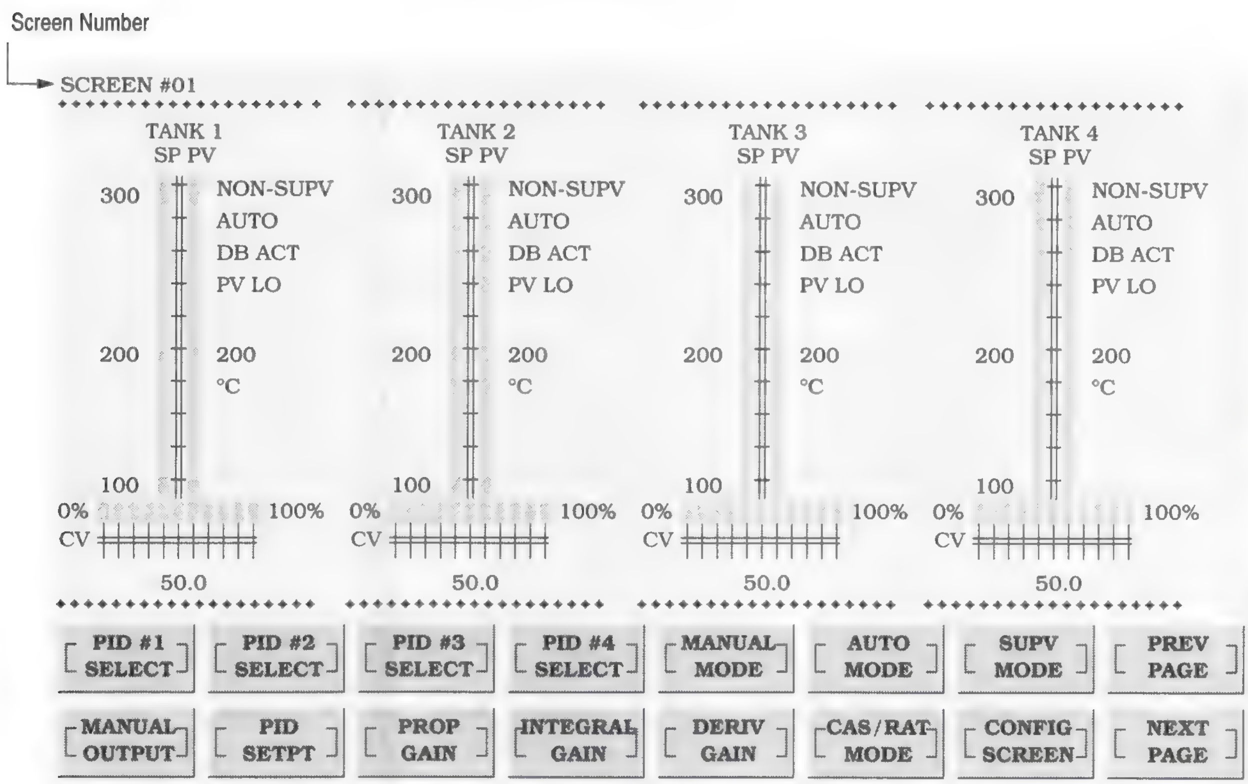


Figure 16.5 shows the fields for each loop.

Figure 16.5
Field Identification

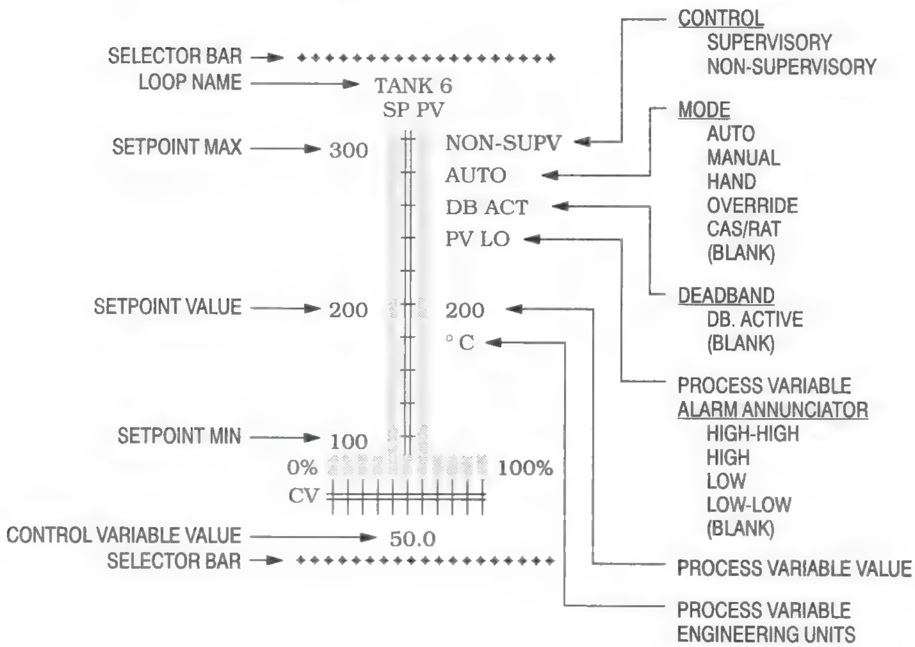


Table 16.E lists the actions available from fixed PCO faceplate screens.

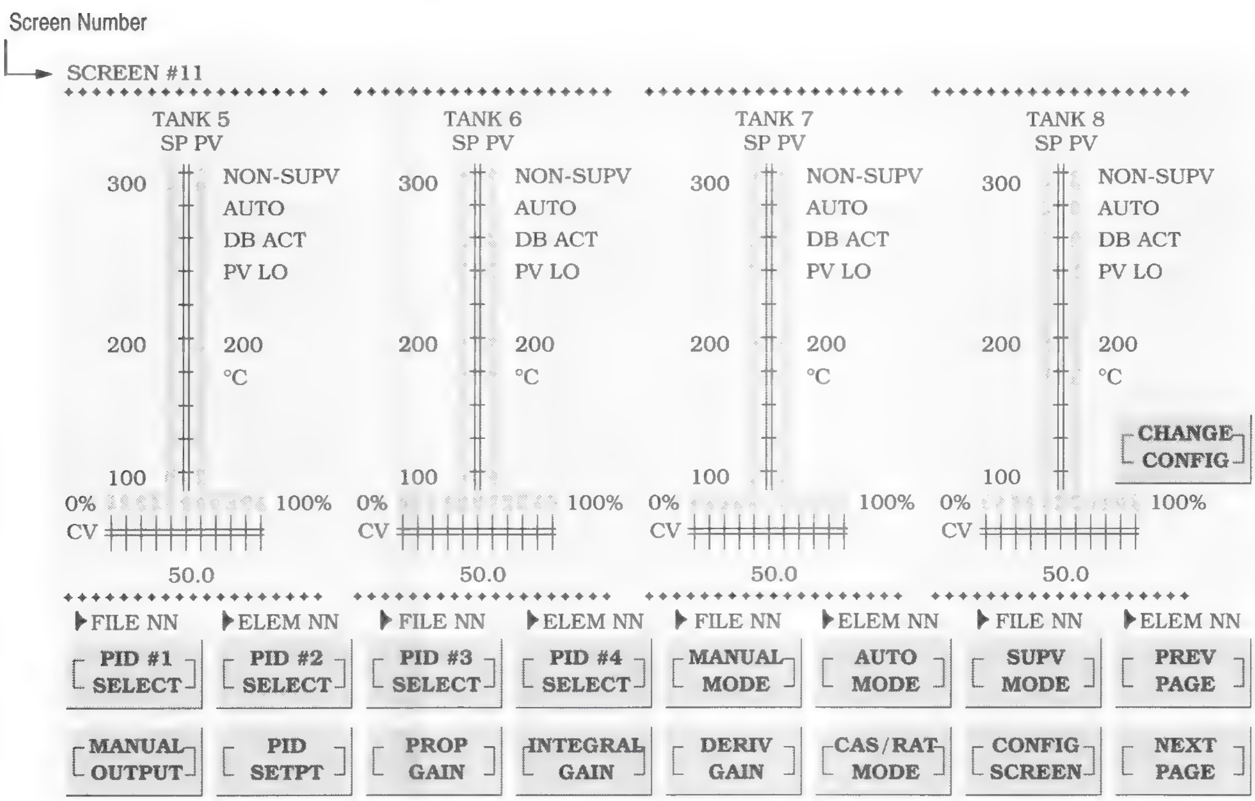
Table 16.E
Actions Available from Fixed Faceplate Screens

To do this:	Press this key:
Select one of the four loops shown on the screen. The selection bars of the selected loop have a different color than those not selected.	PID #n SELECT
Specify manual mode for the selected loop. This sets the manual mode request bit in the PID function.	MANUAL MODE
Specify automatic mode for the selected loop. This sets the auto mode request bit in the PID function.	AUTO MODE
Specify supervisory mode for the selected loop. This sets the supervisory request bit in the PID function.	SUPV MODE
Specify cascade/ratio mode for the selected loop. This sets the cascade/ratio mode request bit in the PID function.	CAS/RAT MODE
Specify the manual output for the selected loop in the data entry window which appears.	MANUAL OUTPUT
Specify the setpoint for the selected loop in the data entry window which appears.	PID SETPT
Specify the proportional gain for the selected loop (if it uses proportional control) in the data entry window which appears.	PROP GAIN
Specify the integral gain for the selected loop (if it uses integral control) in the data entry window which appears.	INTEGRAL GAIN
Specify the derivative gain for the selected loop (if it uses derivative control) in the data entry window which appears.	DERIV GAIN
Select the PCO PanelView configuration screen.	CONFIG SCREEN
Display the previous PCO PanelView faceplate screen.	PREV PAGE
Display the next PCO PanelView faceplate screen.	NEXT PAGE

Monitoring Selectable Loops

There are two variable PCO faceplate screens (Figure 16.6) for the PanelView terminal. Although both of these screens have all the features and functionality of the fixed faceplate screens, they also let you change the loops displayed without modifying the configuration screen.

Figure 16.6
Sample Variable Faceplate Screen



The file and element number fields on these PCO faceplate screens specify the loop displayed at each position. The default values for these fields are the integer file numbers and the starting word offsets you entered on the PCO PanelView configuration screen.

To change the file or element numbers, do the following:

1. Press **[SELECT]**

   A cursor (small arrow) appears next to one of the fields.

2. Using the arrow keys, move the cursor to the field you want to change.

3. Press **[CHANGE CONFIG]** to open a data entry window. Enter the new file or element value and either press **[ENTER]** to move to the next field or press **[CANCEL]** to close the window.

   This will not change the corresponding entries on the configuration screen. Changes will remain in effect only until the system is restarted.

Chapter 17

Monitoring Analog I/O

Chapter Objectives

This chapter describes how you monitor analog inputs and outputs with PCO analog I/O faceplates.

Introduction to Analog I/O Faceplates

PCO provides faceplates for the following analog I/O functions:

- 1771-IFE analog input
- 1771-IL isolated analog input
- 1771-IR resistive temperature device
- 1771-IXE thermocouple
- 1771-IXHR Hi-Res thermocouple
- 1771-QRD pulse
- 1771-OFE analog output
- 1771-N-series analog I/O

These faceplates let you monitor analog inputs and outputs from the ControlView environment.

Device faceplates are Mouse-GRAFIX screens; consequently, you must have the Mouse-GRAFIX option (6190-MGX) installed if you wish to customize them. The size of each faceplate depends on the function.

Monitoring Analog I/O

Every analog I/O function configured has a unique faceplate. To use a faceplate, do the following:

1. Access the faceplate for the analog I/O function desired.
2. View analog I/O status.
3. Press `[Esc]` to remove the faceplate from the screen when finished.

Access Analog I/O Faceplates

The method you use to display analog I/O faceplates depends on where you are in the software. Table 17.A lists the methods available.

Table 17.A
Accessing Analog I/O Faceplates

To access the faceplate from the:	Do this:
PCO device structures menu screen	select “Faceplate” from the menu bar.
PCO configuration screen	select “Faceplate” from the menu bar.
ControlView	1. press [Alt-C] to bring up the ControlView command line 2. type DISPLAY *x*FP /T*tagname* (where *x* is one of the following: IFE, IL, IR, IXE, IXH, QRD, OFE, or NS) 3. press [Enter]
Batch/Process keyboard	press the key, if one has been defined, dedicated to the particular device you want to monitor (these keys must be assigned and programmed by your system programmer).

Monitoring IFE Functions

Figure 17.1 shows a sample IFE faceplate. Table 17.B describes each of the fields on the faceplate.

Figure 17.1
Sample IFE Faceplate

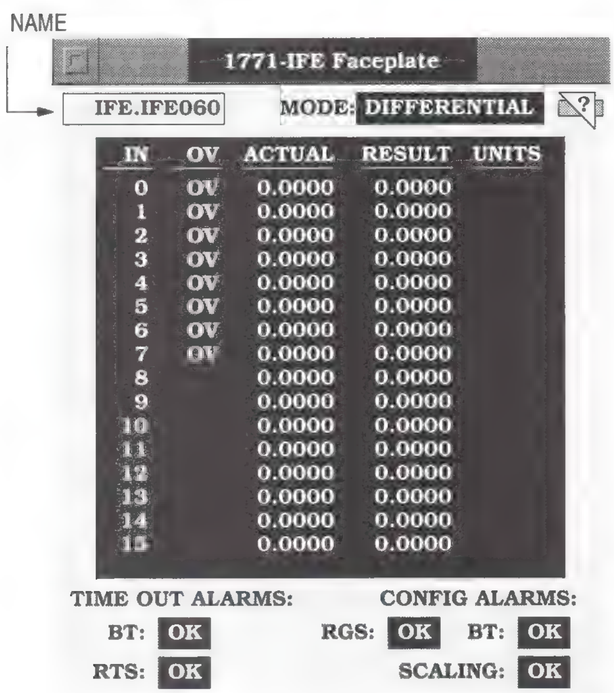


Table 17.B
Field Descriptions for IFE Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
IN	the channel number.
OV	the override status for each channel.
ACTUAL	the actual value for each channel.
RESULT	the resultant value for each channel.
UNITS	the engineering units configured for the resultant value tag of each channel.
TIME-OUT ALARMS	the status of the Block Transfer and Real Time Sample time-out alarms.
CONFIG ALARMS	the status of the Rack/Group/Slot, Block Transfer, and Scaling configuration alarms.

Monitoring IL Functions

Figure 17.2 shows a sample IL faceplate. Table 17.C describes each of the fields on the faceplate.

Figure 17.2
Sample IL Faceplate

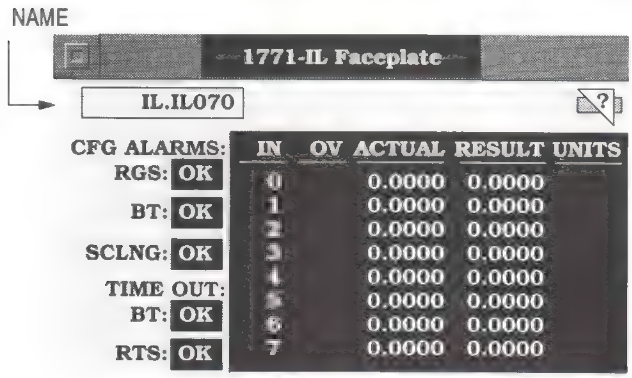


Table 17.C
Field Descriptions for IL Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
IN	the channel number.
OV	the override status for each channel.
ACTUAL	the actual value for each channel.
RESULT	the resultant value for each channel.
UNITS	the engineering units configured for the resultant value tag of each channel.
CFG ALARMS	the status of the Rack/Group/Slot, Block Transfer, and Scaling configuration alarms.
TIME-OUT ALARMS	the status of the Block Transfer and Real Time Sample time-out alarms.

Monitoring IR Functions

Figure 17.3 shows a sample IR faceplate. Table 17.D describes each of the fields on the faceplate.

Figure 17.3
Sample IR Faceplate

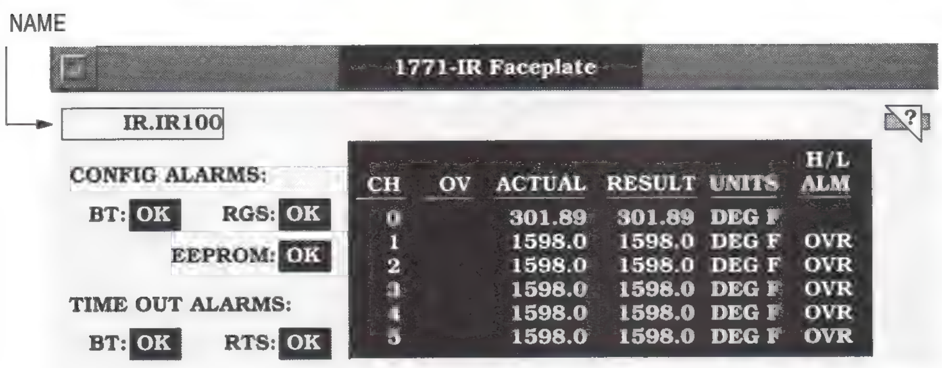


Table 17.D
Field Descriptions for IR Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
CH	the channel number.
OV	the override status for each channel.
ACTUAL	the actual value for each channel.
RESULT	the resultant value for each channel.
UNITS	either ohms, degrees C, or degrees F, as appropriate.
CONFIG ALARMS	the status of the Block Transfer, Rack/Group/Slot, and EEPROM configuration alarms.
TIME-OUT ALARMS	the status of the Block Transfer and Real Time Sample time-out alarms.
H/L ALM	whether an input is underrange or overrange.

Monitoring IXE Functions

Figure 17.4 shows a sample IXE faceplate. Table 17.E describes each of the fields on the faceplate.

Figure 17.4
Sample IXE Faceplate

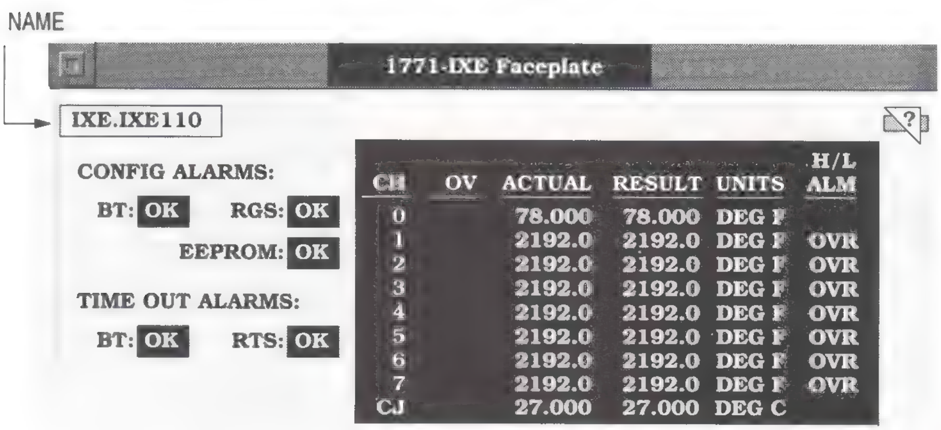


Table 17.E
Field Descriptions for IXE Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
CH	the channel number.
OV	the override status for each channel.
ACTUAL	the actual value for each channel.
RESULT	the resultant value for each channel.
UNITS	either millivolts, degrees C, or degrees F, as appropriate.
CONFIG ALARMS	the status of the Block Transfer, Rack/Group/Slot, and EEPROM configuration alarms.
TIME-OUT ALARMS	the status of the Block Transfer and Real Time Sample time-out alarms.
H/L ALM	whether an input is underrange or overrange, in low alarm, or in high alarm.

Monitoring IXHR Functions

Figure 17.5 shows a sample IXHR faceplate. Table 17.F describes each of the fields on the faceplate.

Figure 17.5
Sample IXHR Faceplate

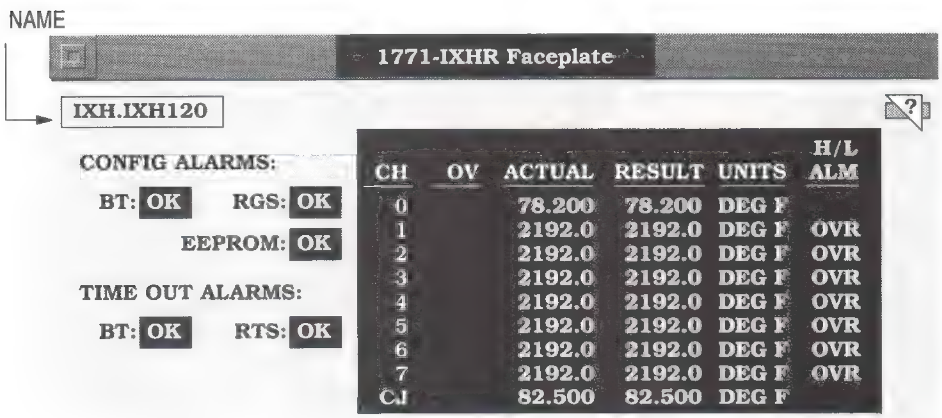


Table 17.F
Field Descriptions for IXHR Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
CH	the channel number.
OV	the override status for each channel.
ACTUAL	the actual value for each channel.
RESULT	the resultant value for each channel.
UNITS	either millivolts, degrees C, or degrees F, as appropriate.
CONFIG ALARMS	the status of the Block Transfer, Rack/Group/Slot, and EEPROM configuration alarms.
TIME-OUT ALARMS	the status of the Block Transfer and Real Time Sample time-out alarms.
H/L ALM	whether an input is underrange or overrange, in low alarm, or in high alarm.

Monitoring QRD Functions

Figure 17.6 shows a sample QRD faceplate. Table 17.G describes each of the fields on the faceplate.

Figure 17.6
Sample QRD Faceplate

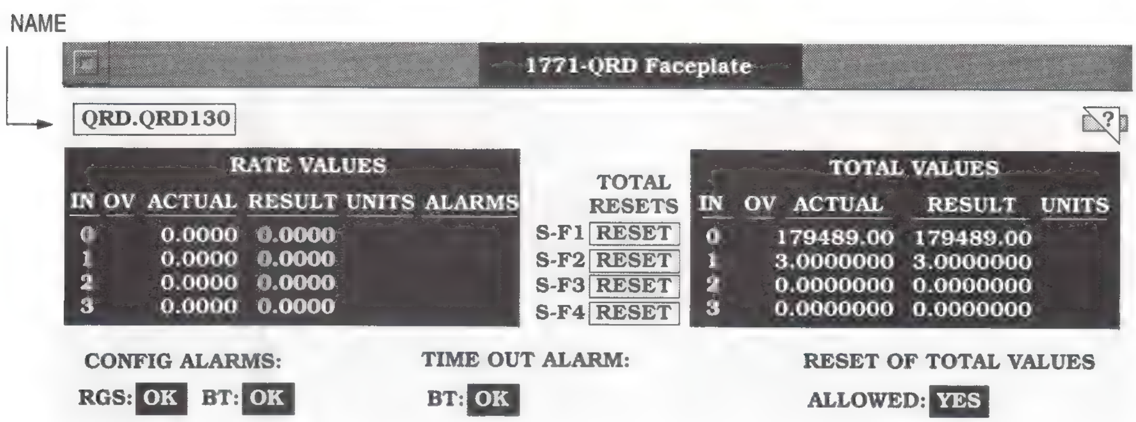


Table 17.G
Field Descriptions for QRD Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
RATE VALUES	the channel number, the override status, the actual value, the resultant value, the engineering units configured for the resultant value tag, and indicates whether a rate input is overrange (>10 kHz).
TOTAL VALUES	the channel number, the override status, the actual value, the resultant value, and the engineering units configured for the resultant value tag.
CONFIG ALARMS	the status of the Rack/Group/Slot and Block Transfer configuration alarms.
TIME-OUT ALARMS	the status of the Block Transfer alarm.
RESET OF TOTAL VALUES ALLOWED	whether or not you can reset the total value for each input, individually, by either clicking on the buttons or by pressing [Shift-F1] through [Shift-F4].

Monitoring OFE Functions

Figure 17.7 shows a sample OFE faceplate. Table 17.H describes each of the fields on the faceplate.

Figure 17.7
Sample OFE Faceplate

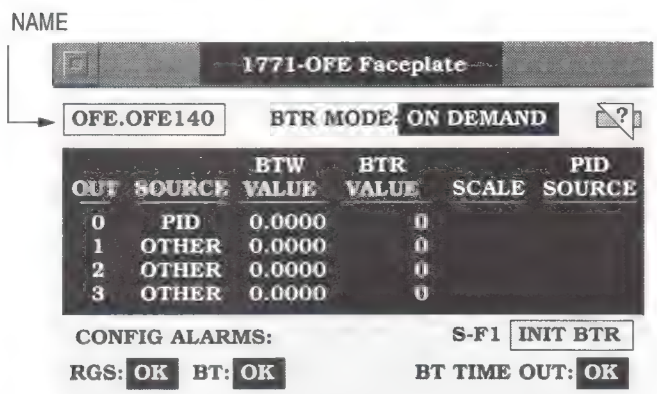


Table 17.H
Field Descriptions for OFE Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
BTR MODE	the status of block transfer read mode (ON-DEMAND or CONTINUOUS).
OUT	the channel number.
SOURCE	either PID to indicate that the output is obtaining its data from a PID function or OTHER to indicate that the output is obtaining its data from an alternate source.
BTW VALUE	the scaled output value in engineering units being sent to the output channel.
BTR VALUE	the actual D/A converter counts being used for the output channel.
SCALE	BAD if the scaled output value is outside the range of valid values defined by the minimum and maximum scaling values.
PID SOURCE	BAD if the output is configured for PID source but an invalid PID source location was configured.
CONFIG ALARMS	the status of the Rack/Group/Slot and Block Transfer configuration alarms.
INIT BTR	To initiate a block transfer read, click on the button or press [Shift-F1].
BT TIME-OUT	the status of the Block Transfer time-out alarm.

Monitoring N-series Functions

Figure 17.8 shows a sample N-series faceplate. Table 17.I describes each of the fields on the faceplate.

Figure 17.8
Sample N-series Faceplate

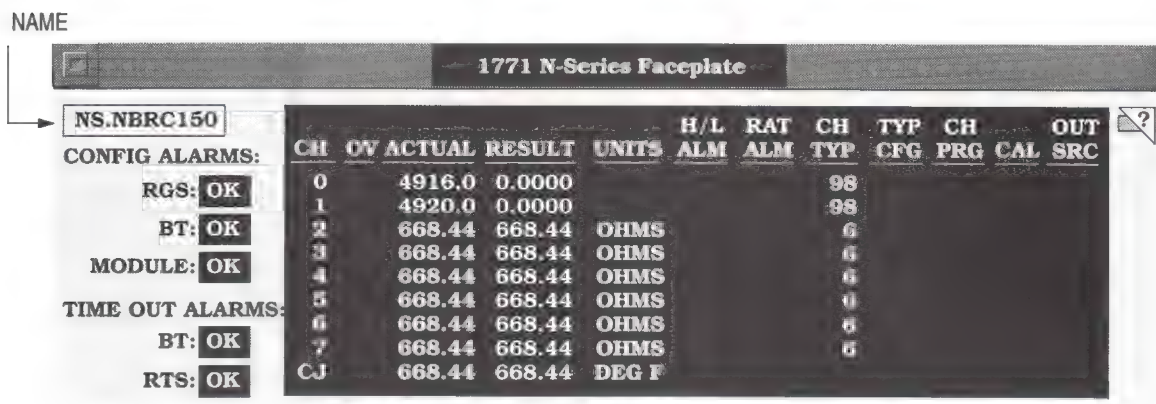


Table 17.I
Field Descriptions for N-series Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
CONFIG ALARMS	the status of the Rack/Group/Slot, Block Transfer, and Module configuration alarms.
TIME-OUT ALARMS	the status of the Block Transfer and Real Time Sample time-out alarms.
CH	the channel number.
OV	the override status for each channel.
ACTUAL	the actual value for each channel.
RESULT	the resultant value for each channel.
UNITS	either the engineering units configured for the resultant value tag, millivolts, ohms, degrees C, or degrees F, as appropriate.
H/L ALM	whether an input is underrange, overrange, in low alarm, or in high alarm.
RAT ALM	whether a rate alarm has been exceeded.
CH TYP	the channel type as read from the module.
TYP CFG, CH PRG, CAL, OUT SRC	BAD if any of these configuration alarms (invalid channel type configuration, invalid channel programming, invalid calibration values, invalid output source) occur.

Chapter 18

Monitoring Devices

Chapter Objectives

This chapter describes how you monitor two-state and three-state devices with PCO device faceplates.

Introduction to Device Faceplates

PCO provides faceplates for the two-state and three-state device-driver functions. These faceplates allow you to monitor and control devices from the ControlView environment.

Device faceplates are Mouse-GRAFIX screens; consequently, you must have the Mouse-GRAFIX option (6190-MGX) installed if you wish to customize them. The size of each faceplate is one-fourth of the screen size.

Monitoring Devices

There is a unique faceplate for every two-state and three-state device configured. To use a faceplate, do the following:

1. Access the faceplate for the device desired.
2. View and/or control device operation, as desired.
3. When finished, press `[Esc]` to remove the faceplate from the screen.

Access Device Faceplates

The method you use to display faceplates for two-state and three-state devices depends on where you are in the software. Table 18.A lists the methods available.

Table 18.A
Accessing Device Faceplates

To access the faceplate from the:	Do this:
PCO device structures menu screen	select “Faceplate” from the menu bar.
PCO configuration screen	select “Faceplate” from the menu bar.
ControlView	1. press [Alt-C] to bring up the ControlView command line 2. type DISPLAY DD2FP /T*tagname* or DISPLAY DD3FP/T*tagname* 3. press [Enter]
Batch/Process keyboard	press the key, if one has been defined, dedicated to the particular device you want to monitor (these keys must be assigned and programmed by your system programmer).

Monitoring Two-State Devices

Figure 18.1 shows a sample two-state device faceplate. Table 18.B describes each of the fields on the faceplate.

Figure 18.1
Sample Faceplate for a Two-State Device

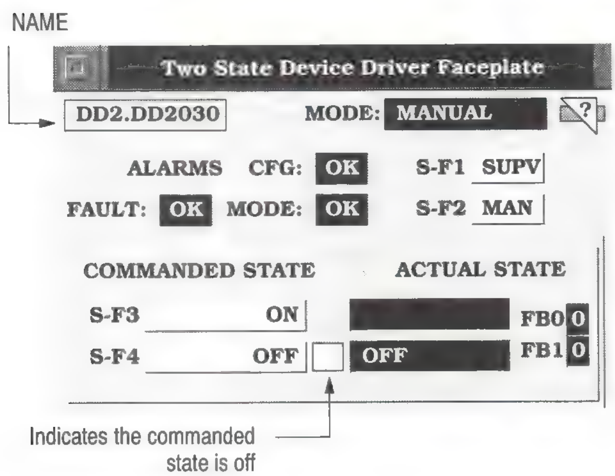


Table 18.B
Field Descriptions for DD2 Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
MODE	the current operating mode. If desired, you can change the operating mode by clicking on the buttons or pressing [Shift-F1] and/or [Shift-F2].
ALARMS	the status of the device configuration, fault, and mode alarms.
COMMANDED STATE	the commanded state of the device. If desired, you can change the commanded state by clicking on the buttons or pressing [Shift-F3] and/or [Shift-F4]. The text displayed on these fields can be changed by modifying the tags in the database.
ACTUAL STATE	the actual state of the device; and, the boolean status of feedback inputs FB0 and FB1. The text displayed on these fields can be changed by modifying the tags in the database.

Monitoring Three-State Devices

Figure 18.2 shows a sample three-state device faceplate. Table 18.C describes each of the fields on the faceplate.

Figure 18.2
Sample Faceplate for a Three-State Device

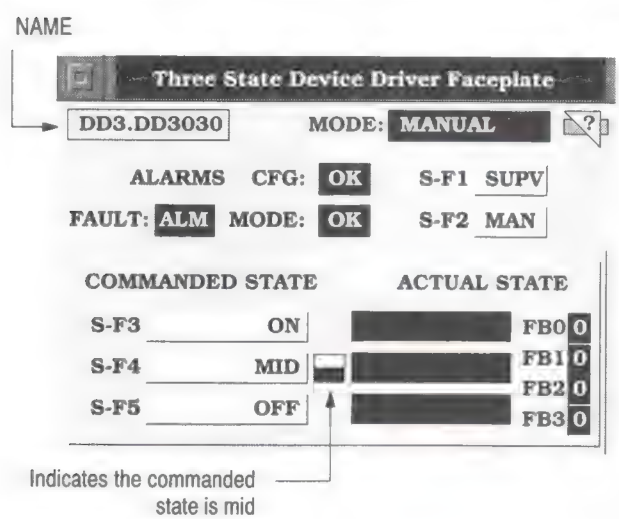


Table 18.C
Field Descriptions for DD3 Faceplates

This field:	Shows:
NAME	the name of the tag being displayed.
MODE	the current operating mode. If desired, you can change the operating mode by clicking on the buttons or pressing [Shift-F1] and/or [Shift-F2]. The text displayed on these fields can be changed by modifying the tags in the database.
ALARMS	the status of the device configuration, fault, and mode alarms.
COMMANDED STATE	the commanded state of the device. If desired, you can change the commanded state by clicking on the buttons or pressing [Shift-F3], [Shift-F4], and/or [Shift-F5]. The text displayed on these fields can be changed by modifying the tags in the database.
ACTUAL STATE	the actual state of device; and the boolean state of feedback inputs FB0 through FB3.

ControlView Tags

Predefined tags provide the path for the faceplates to access the correct PLC data for the function being monitored. The tags also can be used by custom user-developed mouse graphics to display function data in any desired format. This appendix lists the predefined ControlView database tags for each PCO function. Table A.A lists the tables by function.

Table A.A
Database Tag Descriptions

ControlView tags for:	See:	On page:
PID (regulatory loop)	Table A.B	A-2
1771-IFE Functions (analog input)	Table A.C	A-4
1771-IL Functions (isolated analog input)	Table A.D	A-6
1771-IR Functions (Resistive Temperature Device)	Table A.E	A-7
1771-IXE Functions (Thermocouple)	Table A.F	A-9
1771-IXHR Functions (hi-res Thermocouple)	Table A.G	A-12
1771-QRD Functions (pulse)	Table A.H	A-15
1771-OFE Functions (analog output)	Table A.I	A-16
N-series Functions (analog I/O)	Table A.J	A-17
DD2 (two-state device)	Table A.K	A-21
DD3 (three-state device)	Table A.L	A-22

Table A.B
Tag Descriptions for PID Function

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure			
PID.CLONE540.ACVC	D	S	Invalid CV configuration
PID.CLONE540.N.ADH	D	S	Deviation high
PID.CLONE540.N.ADHH	D	S	Deviation high-high
PID.CLONE540.N.ADL	D	S	Deviation low
PID.CLONE540.N.ADLL	D	S	Deviation low-low
PID.CLONE540.N.AMLC	D	S	Invalid master loop configuration
PID.CLONE540.N.APVB	D	S	PV health bad
PID.CLONE540.N.ATBB	D	S	TB health bad
PID.CLONE540.N.ARIB	D	S	Ratio input health bad
PID.CLONE540.N.ACVB	D	S	CV health bad
PID.CLONE540.N.APH	D	S	PV high
PID.CLONE540.N.APHH	D	S	PV high-high
PID.CLONE540.N.APL	D	S	PV low
PID.CLONE540.N.APLL	D	S	PV low-low
PID.CLONE540.N.APVC	D	S	Invalid PV configuration
PID.CLONE540.N.ARIC	D	S	Invalid ratio input configuration
PID.CLONE540.N.ASLC	D	S	Invalid slave loop configuration
PID.CLONE540.N.ASPR	D	S	SP out of range
PID.CLONE540.N.ATBC	D	S	Invalid TB configuration
PID.CLONE540.N.AUPD	D	S	Invalid loop update time
PID.CLONE540.N.AUTR	D		Auto request from ControlView
PID.CLONE540.N.AUTS	D		Auto mode
PID.CLONE540.N.CREN	D		Cascade/ratio mode allowed
PID.CLONE540.N.CRR	D		Cascade/ratio request from ControlView
PID.CLONE540.N.CRS	D		Cascade/ratio mode
PID.CLONE540.N.DBS	D		Deadband in effect
PID.CLONE540.N.HNDS	D		Hand mode
PID.CLONE540.N.MANR	D		Manual request from ControlView
PID.CLONE540.N.MANS	D		Manual mode
PID.CLONE540.N.NRMS	D		Non-supervisory SP ramp in progress
PID.CLONE540.N.OVRS	D		Override mode
PID.CLONE540.N.RMPT	A		Non-supervisory ramp time
PID.CLONE540.N.ROFR	D		Non-supervisory SP ramp off request
PID.CLONE540.N.RONR	D		Non-supervisory SP ramp on request
PID.CLONE540.N.SLAV	D		Slave loop
PID.CLONE540.N.SUPR	D		Supervisory request from ControlView
PID.CLONE540.N.SUPS	D		Supervisory/non-supervisory mode
PID.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
PID.CLONE540.N.TYPE	D		Equation

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.B
Tag Descriptions for PID Function Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Floating Point Structure			
PID.CLONE540.F.BIAS	A		Feedforward or bias
PID.CLONE540.F.CV	A		CV value
PID.CLONE540.F.CVR	A		Non-supervisory manual output
PID.CLONE540.F.ERR	A		Error value
PID.CLONE540.F.KD	A		Derivative gain
PID.CLONE540.F.KI	A		Integral gain
PID.CLONE540.F.KP	A		Proportional gain
PID.CLONE540.F.MAXS	A		PV engineering units maximum
PID.CLONE540.F.MINS	A		PV engineering units minimum
PID.CLONE540.F.PV	A		PV value
PID.CLONE540.F.RAT	A		Ratio multiplier
PID.CLONE540.F.RATR	A		Non-supervisory ratio multiplier
PID.CLONE540.F.RMTG	A		Non-supervisory SP ramp target
PID.CLONE540.F.SP	A		SP value (engineering units)
PID.CLONE540.F.SPR	A		Non-supervisory SP

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.C
Tag Descriptions for IFE Functions

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure			
IFE.CLONE540.N.ASC	D	S	Invalid scaling
IFE.CLONE540.N.ABTC	D	S	Invalid block transfer file configuration
IFE.CLONE540.N.ABTT	D	S	Block transfer time-out
IFE.CLONE540.N.ARGS	D	S	Invalid rack, group, or slot
IFE.CLONE540.N.ARTS	D	SH	Real-time sample time-out
IFE.CLONE540.N.HRTS	D		Real-time sample time-out handshake
IFE.CLONE540.N.I00O	D		Input-0 override status
IFE.CLONE540.N.I01O	D		Input-1 override status
IFE.CLONE540.N.I02O	D		Input-2 override status
IFE.CLONE540.N.I03O	D		Input-3 override status
IFE.CLONE540.N.I04O	D		Input-4 override status
IFE.CLONE540.N.I05O	D		Input-5 override status
IFE.CLONE540.N.I06O	D		Input-6 override status
IFE.CLONE540.N.I07O	D		Input-7 override status
IFE.CLONE540.N.I08O	D		Input-8 override status
IFE.CLONE540.N.I09O	D		Input-9 override status
IFE.CLONE540.N.I10O	D		Input-10 override status
IFE.CLONE540.N.I11O	D		Input-11 override status
IFE.CLONE540.N.I12O	D		Input-12 override status
IFE.CLONE540.N.I13O	D		Input-13 override status
IFE.CLONE540.N.I14O	D		Input-14 override status
IFE.CLONE540.N.I15O	D		Input-15 override status
IFE.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
IFE.CLONE540.N.TYPE	D		IFE configuration type (single-ended or differential)
Tags in Floating Point Structure			
IFE.CLONE540.F.I00A	A		Input-0 actual value
IFE.CLONE540.F.I00R	A		Input-0 resultant value
IFE.CLONE540.F.I01A	A		Input-1 actual value
IFE.CLONE540.F.I01R	A		Input-1 resultant value
IFE.CLONE540.F.I02A	A		Input-2 actual value
IFE.CLONE540.F.I02R	A		Input-2 resultant value
IFE.CLONE540.F.I03A	A		Input-3 actual value
IFE.CLONE540.F.I03R	A		Input-3 resultant value
IFE.CLONE540.F.I04A	A		Input-4 actual value
IFE.CLONE540.F.I04R	A		Input-4 resultant value
IFE.CLONE540.F.I05A	A		Input-5 actual value
IFE.CLONE540.F.I05R	A		Input-5 resultant value
IFE.CLONE540.F.I06A	A		Input-6 actual value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.C
Tag Descriptions for IFE Functions Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Floating Point Structure Continued			
IFE.CLONE540.F.I06R	A		Input-6 resultant value
IFE.CLONE540.F.I07A	A		Input-7 actual value
IFE.CLONE540.F.I07R	A		Input-7 resultant value
IFE.CLONE540.F.I08A	A		Input-8 actual value
IFE.CLONE540.F.I08R	A		Input-8 resultant value
IFE.CLONE540.F.I09A	A		Input-9 actual value
IFE.CLONE540.F.I09R	A		Input-9 resultant value
IFE.CLONE540.F.I10A	A		Input-10 actual value
IFE.CLONE540.F.I10R	A		Input-10 resultant value
IFE.CLONE540.F.I11A	A		Input-11 actual value
IFE.CLONE540.F.I11R	A		Input-11 resultant value
IFE.CLONE540.F.I12A	A		Input-12 actual value
IFE.CLONE540.F.I12R	A		Input-12 resultant value
IFE.CLONE540.F.I13A	A		Input-13 actual value
IFE.CLONE540.F.I13R	A		Input-13 resultant value
IFE.CLONE540.F.I14A	A		Input-14 actual value
IFE.CLONE540.F.I14R	A		Input-14 resultant value
IFE.CLONE540.F.I15A	A		Input-15 actual value
IFE.CLONE540.F.I15R	A		Input-15 resultant value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.D
Tag Descriptions for IL Functions

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure			
IL.CLONE540.N.ASC	D	S	Invalid scaling
IL.CLONE540.N.ABTC	D	S	Invalid block transfer file configuration
IL.CLONE540.N.ABTT	D	S	Block transfer time-out
IL.CLONE540.N.ARGS	D	S	Invalid rack, group, or slot
IL.CLONE540.N.ARTS	D	SH	Real-time sample time-out
IL.CLONE540.N.HRTS	D		Real-time sample time-out handshake
IL.CLONE540.N.I00O	D		Input-0 override status
IL.CLONE540.N.I01O	D		Input-1 override status
IL.CLONE540.N.I02O	D		Input-2 override status
IL.CLONE540.N.I03O	D		Input-3 override status
IL.CLONE540.N.I04O	D		Input-4 override status
IL.CLONE540.N.I05O	D		Input-5 override status
IL.CLONE540.N.I06O	D		Input-6 override status
IL.CLONE540.N.I07O	D		Input-7 override status
IL.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
Tags in Floating Point Structure			
IL.CLONE540.F.I00A	A		Input-0 actual value
IL.CLONE540.F.I00R	A		Input-0 resultant value
IL.CLONE540.F.I01A	A		Input-1 actual value
IL.CLONE540.F.I01R	A		Input-1 resultant value
IL.CLONE540.F.I02A	A		Input-2 actual value
IL.CLONE540.F.I02R	A		Input-2 resultant value
IL.CLONE540.F.I03A	A		Input-3 actual value
IL.CLONE540.F.I03R	A		Input-3 resultant value
IL.CLONE540.F.I04A	A		Input-4 actual value
IL.CLONE540.F.I04R	A		Input-4 resultant value
IL.CLONE540.F.I05A	A		Input-5 actual value
IL.CLONE540.F.I05R	A		Input-5 resultant value
IL.CLONE540.F.I06A	A		Input-6 actual value
IL.CLONE540.F.I06R	A		Input-6 resultant value
IL.CLONE540.F.I07A	A		Input-7 actual value
IL.CLONE540.F.I07R	A		Input-7 resultant value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.E
Tag Descriptions for IR Functions

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure			
IR.CLONE540.N.ABTC	D	S	Invalid block transfer file configuration
IR.CLONE540.N.ABTT	D	S	Block transfer time-out
IR.CLONE540.N.ARGS	D	S	Invalid rack, group, or slot
IR.CLONE540.N.ARTS	D	SH	Real-time sample time-out
IR.CLONE540.N.HRTS	D		Real-time sample time-out handshake
IR.CLONE540.N.AEEP	D	S	EEPROM could not be read
IR.CLONE540.N.AI0U	D	S	Input-0 underrange
IR.CLONE540.N.II0O	D	S	Input-0 overrange
IR.CLONE540.N.AI1U	D	S	Input-1 underrange
IR.CLONE540.N.II1O	D	S	Input-1 overrange
IR.CLONE540.N.AI2U	D	S	Input-2 underrange
IR.CLONE540.N.II2O	D	S	Input-2 overrange
IR.CLONE540.N.AI3U	D	S	Input-3 underrange
IR.CLONE540.N.II3O	D	S	Input-3 overrange
IR.CLONE540.N.AI4U	D	S	Input-4 underrange
IR.CLONE540.N.II4O	D	S	Input-4 overrange
IR.CLONE540.N.AI5U	D	S	Input-5 underrange
IR.CLONE540.N.II5O	D	S	Input-5 overrange
IR.CLONE540.N.I00O	D		Input-0 override status
IR.CLONE540.N.I01O	D		Input-1 override status
IR.CLONE540.N.I02O	D		Input-2 override status
IR.CLONE540.N.I03O	D		Input-3 override status
IR.CLONE540.N.I04O	D		Input-4 override status
IR.CLONE540.N.I05O	D		Input-5 override status
IR.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
IR.CLONE540.N.I00U	D		Input-0 engineering units (This tag contains the text for the device name on the faceplate).
IR.CLONE540.N.I01U	D		Input-1 engineering units (This tag contains the text for the engineering units on the faceplate).
IR.CLONE540.N.I02U	D		Input-2 engineering units (This tag contains the text for the engineering units on the faceplate).
IR.CLONE540.N.I03U	D		Input-3 engineering units (This tag contains the text for the engineering units on the faceplate).
IR.CLONE540.N.I04U	D		Input-4 engineering units (This tag contains the text for the engineering units on the faceplate).
IR.CLONE540.N.I05U	D		Input-5 engineering units (This tag contains the text for the engineering units on the faceplate).
IR.CLONE540.N.FC	D		Degrees F/Degrees C indicator

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.E
Tag Descriptions for IR Functions Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Floating Point Structure			
IR.CLONE540.F.I00R	A		Input-0 resultant value
IR.CLONE540.F.I01A	A		Input-1 actual value
IR.CLONE540.F.I01R	A		Input-1 resultant value
IR.CLONE540.F.I02A	A		Input-2 actual value
IR.CLONE540.F.I02R	A		Input-2 resultant value
IR.CLONE540.F.I03A	A		Input-3 actual value
IR.CLONE540.F.I03R	A		Input-3 resultant value
IR.CLONE540.F.I04A	A		Input-4 actual value
IR.CLONE540.F.I04R	A		Input-4 resultant value
IR.CLONE540.F.I05A	A		Input-5 actual value
IR.CLONE540.F.I05R	A		Input-5 resultant value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.F
Tag Descriptions for IXE Functions

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure			
IXE.CLONE540.N.ABTC	D	S	Invalid block transfer file configuration
IXE.CLONE540.N.ABTT	D	S	Block transfer time-out
IXE.CLONE540.N.ARGS	D	S	Invalid rack, group, or slot
IXE.CLONE540.N.ARTS	D	SH	Real-time sample time-out
IXE.CLONE540.N.HRTS	D		Real-time sample time-out handshake
IXE.CLONE540.N.ACJL	D	S	Low cold junction temperature
IXE.CLONE540.N.ACJH	D	S	High cold junction temperature
IXE.CLONE540.N.AEEP	D	S	EEPROM could not be read
IXE.CLONE540.N.AI0U	D	S	Input-0 underrange
IXE.CLONE540.N.AI0O	D	S	Input-0 overrange
IXE.CLONE540.N.AI1U	D	S	Input-1 underrange
IXE.CLONE540.N.AI1O	D	S	Input-1 overrange
IXE.CLONE540.N.AI2U	D	S	Input-2 underrange
IXE.CLONE540.N.AI2O	D	S	Input-2 overrange
IXE.CLONE540.N.AI3U	D	S	Input-3 underrange
IXE.CLONE540.N.AI3O	D	S	Input-3 overrange
IXE.CLONE540.N.AI4U	D	S	Input-4 underrange
IXE.CLONE540.N.AI4O	D	S	Input-4 overrange
IXE.CLONE540.N.AI5U	D	S	Input-5 underrange
IXE.CLONE540.N.AI5O	D	S	Input-5 overrange
IXE.CLONE540.N.AI6U	D	S	Input-6 underrange
IXE.CLONE540.N.AI6O	D	S	Input-6 overrange
IXE.CLONE540.N.AI7U	D	S	Input-7 underrange
IXE.CLONE540.N.AI7O	D	S	Input-7 overrange
IXE.CLONE540.N.AI0L	D	S	Input-0 low
IXE.CLONE540.N.AI0H	D	S	Input-0 high
IXE.CLONE540.N.AI1L	D	S	Input-1 low
IXE.CLONE540.N.AI1H	D	S	Input-1 high
IXE.CLONE540.N.AI2L	D	S	Input-2 low
IXE.CLONE540.N.AI2H	D	S	Input-2 high
IXE.CLONE540.N.AI3L	D	S	Input-3 low
IXE.CLONE540.N.AI3H	D	S	Input-3 high
IXE.CLONE540.N.AI4L	D	S	Input-4 low
IXE.CLONE540.N.AI4H	D	S	Input-4 high

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display degrees F, degrees C, or mV.

Table A.F
Tag Descriptions for IXE Functions Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure Continued			
IXE.CLONE540.N.AI5L	D	S	Input-5 low
IXE.CLONE540.N.AI5H	D	S	Input-5 high
IXE.CLONE540.N.AI6L	D	S	Input-6 low
IXE.CLONE540.N.AI6H	D	S	Input-6 high
IXE.CLONE540.N.AI7L	D	S	Input-7 low
IXE.CLONE540.N.AI7H	D	S	Input-7 high
IXE.CLONE540.N.I00O	D		Input-0 override status
IXE.CLONE540.N.I01O	D		Input-1 override status
IXE.CLONE540.N.I02O	D		Input-2 override status
IXE.CLONE540.N.I03O	D		Input-3 override status
IXE.CLONE540.N.I04O	D		Input-4 override status
IXE.CLONE540.N.I05O	D		Input-5 override status
IXE.CLONE540.N.I06O	D		Input-6 override status
IXE.CLONE540.N.I07O	D		Input-7 override status
IXE.CLONE540.N.ICJO	D		Cold junction override status
IXE.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
IXE.CLONE540.N.I00U	D		Input 0 engineering units[3]
IXE.CLONE540.N.I01U	D		Input 1 engineering units[3]
IXE.CLONE540.N.I02U	D		Input 2 engineering units[3]
IXE.CLONE540.N.I03U	D		Input 3 engineering units[3]
IXE.CLONE540.N.I04U	D		Input 4 engineering units[3]
IXE.CLONE540.N.I05U	D		Input 5 engineering units[3]
IXE.CLONE540.N.I06U	D		Input 6 engineering units[3]
IXE.CLONE540.N.I07U	D		Input 7 engineering units[3]
IXE.CLONE540.N.FC	D		Degrees F/Degrees C indicator[3]
IXE.CLONE540.F.I06A	A		Input-6 actual value
IXE.CLONE540.F.I06R	A		Input-6 resultant value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display degrees F, degrees C, or mV.

Table A.F
Tag Descriptions for IXE Functions Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Floating Point Structure			
IXE.CLONE540.F.I00A	A		Input-0 actual value
IXE.CLONE540.F.I00R	A		Input-0 resultant value
IXE.CLONE540.F.I01A	A		Input-1 actual value
IXE.CLONE540.F.I01R	A		Input-1 resultant value
IXE.CLONE540.F.I02A	A		Input-2 actual value
IXE.CLONE540.F.I02R	A		Input-2 resultant value
IXE.CLONE540.F.I03A	A		Input-3 actual value
IXE.CLONE540.F.I03R	A		Input-3 resultant value
IXE.CLONE540.F.I04A	A		Input-4 actual value
IXE.CLONE540.F.I04R	A		Input-4 resultant value
IXE.CLONE540.F.I05A	A		Input-5 actual value
IXE.CLONE540.F.I05R	A		Input-5 resultant value
IXE.CLONE540.F.I07A	A		Input-7 actual value
IXE.CLONE540.F.I07R	A		Input-7 resultant value
IXE.CLONE540.F.CJA	A		Cold junction actual value
IXE.CLONE540.F.CJR	A		Cold junction resultant value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display degrees F, degrees C, or mV.

Table A.G
Tag Descriptions for IXHR Functions

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure			
IXH.CLONE540.N.ABTC	D	S	Invalid block transfer file configuration
IXH.CLONE540.N.ABTT	D	S	Block transfer time-out
IXH.CLONE540.N.ARGS	D	S	Invalid rack, group, or slot
IXH.CLONE540.N.ARTS	D	SH	Real-time sample time-out
IXH.CLONE540.N.HRTS	D		Real-time sample time-out handshake
IXH.CLONE540.N.ACJL	D	S	Low cold junction temperature
IXH.CLONE540.N.ACJH	D	S	High cold junction temperature
IXH.CLONE540.N.AEEP	D	S	EEPROM could not be read
IXH.CLONE540.N.AI0U	D	S	Input-0 underrange
IXH.CLONE540.N.AI0O	D	S	Input-0 overrange
IXH.CLONE540.N.AI1U	D	S	Input-1 underrange
IXH.CLONE540.N.AI1O	D	S	Input-1 overrange
IXH.CLONE540.N.AI2U	D	S	Input-2 underrange
IXH.CLONE540.N.AI2O	D	S	Input-2 overrange
IXH.CLONE540.N.AI3U	D	S	Input-3 underrange
IXH.CLONE540.N.AI3O	D	S	Input-3 overrange
IXH.CLONE540.N.AI4U	D	S	Input-4 underrange
IXH.CLONE540.N.AI4O	D	S	Input-4 overrange
IXH.CLONE540.N.AI5U	D	S	Input-5 underrange
IXH.CLONE540.N.AI5O	D	S	Input-5 overrange
IXH.CLONE540.N.AI6U	D	S	Input-6 underrange
IXH.CLONE540.N.AI6O	D	S	Input-6 overrange
IXH.CLONE540.N.AI7U	D	S	Input-7 underrange
IXH.CLONE540.N.AI7O	D	S	Input-7 overrange
IXH.CLONE540.N.AI0L	D	S	Input-0 low
IXH.CLONE540.N.AI0H	D	S	Input-0 high
IXH.CLONE540.N.AI1L	D	S	Input-1 low
IXH.CLONE540.N.AI1H	D	S	Input-1 high
IXH.CLONE540.N.AI2L	D	S	Input-2 low
IXH.CLONE540.N.AI2H	D	S	Input-2 high
IXH.CLONE540.N.AI3L	D	S	Input-3 low
IXH.CLONE540.N.AI3H	D	S	Input-3 high

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display degrees F, degrees C, or mV.

Table A.G
Tag Descriptions for IXHR Functions Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure Continued			
IXH.CLONE540.N.AI4L	D	S	Input-4 low
IXH.CLONE540.N.AI4H	D	S	Input-4 high
IXH.CLONE540.N.AI5L	D	S	Input-5 low
IXH.CLONE540.N.AI5H	D	S	Input-5 high
IXH.CLONE540.N.AI6L	D	S	Input-6 low
IXH.CLONE540.N.AI6H	D	S	Input-6 high
IXH.CLONE540.N.AI7L	D	S	Input-7 low
IXH.CLONE540.N.AI7H	D	S	Input-7 high
IXH.CLONE540.N.I00O	D		Input-0 override status
IXH.CLONE540.N.I01O	D		Input-1 override status
IXH.CLONE540.N.I02O	D		Input-2 override status
IXH.CLONE540.N.I03O	D		Input-3 override status
IXH.CLONE540.N.I04O	D		Input-4 override status
IXH.CLONE540.N.I05O	D		Input-5 override status
IXH.CLONE540.N.I06O	D		Input-6 override status
IXH.CLONE540.N.I07O	D		Input-7 override status
IXH.CLONE540.N.ICJO	D		Cold junction override status
IXH.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
IXH.CLONE540.N.I00U	D		Input 0 engineering units[3]
IXH.CLONE540.N.I01U	D		Input 1 engineering units[3]
IXH.CLONE540.N.I02U	D		Input 2 engineering units[3]
IXH.CLONE540.N.I03U	D		Input 3 engineering units[3]
IXH.CLONE540.N.I04U	D		Input 4 engineering units[3]
IXH.CLONE540.N.I05U	D		Input 5 engineering units[3]
IXH.CLONE540.N.I06U	D		Input 6 engineering units[3]
IXH.CLONE540.N.I07U	D		Input 7 engineering units[3]
IXH.CLONE540.N.FC	D		Degrees F/Degrees C indicator[3]

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display degrees F, degrees C, or mV.

Table A.G
Tag Descriptions for IXHR Functions Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Floating Point Structure			
IXH.CLONE540.F.I00A	A		Input-0 actual value
IXH.CLONE540.F.I00R	A		Input-0 resultant value
IXH.CLONE540.F.I01A	A		Input-1 actual value
IXH.CLONE540.F.I01R	A		Input-1 resultant value
IXH.CLONE540.F.I02A	A		Input-2 actual value
IXH.CLONE540.F.I02R	A		Input-2 resultant value
IXH.CLONE540.F.I03A	A		Input-3 actual value
IXH.CLONE540.F.I03R	A		Input-3 resultant value
IXH.CLONE540.F.I04A	A		Input-4 actual value
IXH.CLONE540.F.I04R	A		Input-4 resultant value
IXH.CLONE540.F.I05A	A		Input-5 actual value
IXH.CLONE540.F.I05R	A		Input-5 resultant value
IXH.CLONE540.F.I06A	A		Input-6 actual value
IXH.CLONE540.F.I06R	A		Input-6 resultant value
IXH.CLONE540.F.I07A	A		Input-7 actual value
IXH.CLONE540.F.I07R	A		Input-7 resultant value
IXH.CLONE540.F.CJA	A		Cold junction actual value
IXH.CLONE540.F.CJR	A		Cold junction resultant value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display degrees F, degrees C, or mV.

Table A.H
Tag Descriptions for QRD Functions

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure			
QRD.CLONE540.N.ABTC	D	S	Invalid block transfer file configuration
QRD.CLONE540.N.ABTT	D	S	Block transfer time-out
QRD.CLONE540.N.ARGS	D	S	Invalid rack, group, or slot
QRD.CLONE540.N.AR0O	D	S	Input-0 rate overrange
QRD.CLONE540.N.AR1O	D	S	Input-1 rate overrange
QRD.CLONE540.N.AR2O	D	S	Input-2 rate overrange
QRD.CLONE540.N.AR3O	D	S	Input-3 rate overrange
QRD.CLONE540.N.I0RO	D		Input-0 rate override status
QRD.CLONE540.N.I0TO	D		Input-0 total override status
QRD.CLONE540.N.I1RO	D		Input-1 rate override status
QRD.CLONE540.N.I1TO	D		Input-1 total override status
QRD.CLONE540.N.I2RO	D		Input-2 rate override status
QRD.CLONE540.N.I2TO	D		Input-2 total override status
QRD.CLONE540.N.I3RO	D		Input-3 rate override status
QRD.CLONE540.N.I3TO	D		Input-3 total override status
QRD.CLONE540.N.RA	D		Allow resets from ControlView
QRD.CLONE540.N.I0RS	D		Input-0 total reset from ControlView
QRD.CLONE540.N.I1RS	D		Input-1 total reset from ControlView
QRD.CLONE540.N.I2RS	D		Input-2 total reset from ControlView
QRD.CLONE540.N.I3RS	D		Input-3 total reset from ControlView
QRD.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
Tags in Floating Point Structure			
QRD.CLONE540.F.I0RA	A		Input-0 rate actual value
QRD.CLONE540.F.I0TA	A		Input-0 total actual value
QRD.CLONE540.F.I0RR	A		Input-0 rate resultant value
QRD.CLONE540.F.I0TR	A		Input-0 total resultant value
QRD.CLONE540.F.I1RA	A		Input-1 rate actual value
QRD.CLONE540.F.I1TA	A		Input-1 total actual value
QRD.CLONE540.F.I1RR	A		Input-1 rate resultant value
QRD.CLONE540.F.I1TR	A		Input-1 total resultant value
QRD.CLONE540.F.I2RA	A		Input-2 rate actual value
QRD.CLONE540.F.I2TA	A		Input-2 total actual value
QRD.CLONE540.F.I2RR	A		Input-2 rate resultant value
QRD.CLONE540.F.I2TR	A		Input-2 total resultant value
QRD.CLONE540.F.I3RA	A		Input-3 rate actual value
QRD.CLONE540.F.I3TA	A		Input-3 total actual value
QRD.CLONE540.F.I3RR	A		Input-3 rate resultant value
QRD.CLONE540.F.I3TR	A		Input-3 total resultant value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.I
Tag Descriptions for OFE Functions

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure			
OFE.CLONE540.N.A0SR	D	S	Output-0 Invalid source configuration
OFE.CLONE540.N.A1SR	D	S	Output-1 Invalid source configuration
OFE.CLONE540.N.A2SR	D	S	Output-2 Invalid source configuration
OFE.CLONE540.N.A3SR	D	S	Output-3 Invalid source configuration
OFE.CLONE540.N.A0SC	D	S	Output-0 Invalid scaling
OFE.CLONE540.N.A1SC	D	S	Output-1 Invalid scaling
OFE.CLONE540.N.A2SC	D	S	Output-2 Invalid scaling
OFE.CLONE540.N.A3SC	D	S	Output-3 Invalid scaling
OFE.CLONE540.N.ABTC	D	S	Invalid BT file configuration
OFE.CLONE540.N.ABTT	D	S	Block transfer time-out
OFE.CLONE540.N.ARGS	D	S	Invalid rack, group, or slot
OFE.CLONE540.N.BTRR	D		BTR request
OFE.CLONE540.N.MODE	D		BTR mode
OFE.CLONE540.N.O0BR	A		Output-0 BT read value
OFE.CLONE540.N.O0SR	D		Output-0 Data source
OFE.CLONE540.N.O1BR	A		Output-1 BT read value
OFE.CLONE540.N.O1SR	D		Output-1 Data source
OFE.CLONE540.N.O2BR	A		Output-2 BT read value
OFE.CLONE540.N.O2SR	D		Output-2 Data source
OFE.CLONE540.N.O3BR	A		Output-3 BT read value
OFE.CLONE540.N.O3SR	D		Output-3 Data source
OFE.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
Tags in Floating Point Structure			
OFE.CLONE540.F.O0BW	A		Output-0 BT write value
OFE.CLONE540.F.O1BW	A		Output-1 BT write value
OFE.CLONE540.F.O2BW	A		Output-2 BT write value
OFE.CLONE540.F.O3BW	A		Output-3 BT write value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.J
Tag Descriptions for N-series Functions

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure			
NS.CLONE540.N.ABTC	D	S	Invalid block transfer file configuration
NS.CLONE540.N.ABTT	D	S	Block transfer time-out
NS.CLONE540.N.ARGS	D	S	Invalid rack, group, or slot
NS.CLONE540.N.ARTS	D	SH	Real-time sample time-out
NS.CLONE540.N.HRTS	D		Real-time sample time-out handshake
NS.CLONE540.N.AMF	D	S	Module fault
NS.CLONE540.N.ACJU	D	S	Cold junction temperature underrange
NS.CLONE540.N.ACJO	D	S	Cold junction temperature overrange
NS.CLONE540.N.A0UN	D	S	Channel-0 underrange
NS.CLONE540.N.A0OV	D	S	Channel-0 overrange
NS.CLONE540.N.A0LO	D	S	Channel-0 low alarm / low clamp
NS.CLONE540.N.A0HI	D	S	Channel-0 high alarm / high clamp
NS.CLONE540.N.A0RA	D	SH	Channel-0 rate alarm
NS.CLONE540.N.H0RA	D		Channel-0 rate alarm handshake
NS.CLONE540.N.A0PR	D	S	Channel-0 bad programming
NS.CLONE540.N.A0CA	D	S	Channel-0 bad calibration
NS.CLONE540.N.A0CT	D	S	Channel-0 invalid channel type configuration
NS.CLONE540.N.A0SR	D	S	Channel-0 invalid source configuration
NS.CLONE540.N.A1UN	D	S	Channel-1 underrange
NS.CLONE540.N.A1OV	D	S	Channel-1 overrange
NS.CLONE540.N.A1LO	D	S	Channel-1 low alarm / low clamp
NS.CLONE540.N.A1HI	D	S	Channel-1 high alarm / high clamp
NS.CLONE540.N.A1RA	D	SH	Channel-1 rate alarm
NS.CLONE540.N.H1RA	D		Channel-1 rate alarm handshake
NS.CLONE540.N.A1PR	D	S	Channel-1 bad programming
NS.CLONE540.N.A1CA	D	S	Channel-1 bad calibration
NS.CLONE540.N.A1CT	D	S	Channel-1 invalid channel type configuration
NS.CLONE540.N.A1SR	D	S	Channel-1 invalid source configuration
NS.CLONE540.N.A2UN	D	S	Channel-2 underrange
NS.CLONE540.N.A2OV	D	S	Channel-2 overrange
NS.CLONE540.N.A2LO	D	S	Channel-2 low alarm / low clamp
NS.CLONE540.N.A2HI	D	S	Channel-2 high alarm / high clamp
NS.CLONE540.N.A2RA	D	SH	Channel-2 rate alarm
NS.CLONE540.N.H2RA	D		Channel-2 rate alarm handshake
NS.CLONE540.N.A2PR	D	S	Channel-2 bad programming
NS.CLONE540.N.A2CA	D	S	Channel-2 bad calibration
NS.CLONE540.N.A2CT	D	S	Channel-2 invalid channel type configuration
NS.CLONE540.N.A2SR	D	S	Channel-0 invalid source configuration
NS.CLONE540.N.A3UN	D	S	Channel-3 underrange

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display the engineering units for channels 0-7.

Table A.J
Tag Descriptions for N-series Functions Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure Continued			
NS.CLONE540.N.A3OV	D	S	Channel-3 overrange
NS.CLONE540.N.A3LO	D	S	Channel-3 low alarm / low clamp
NS.CLONE540.N.A3HI	D	S	Channel-3 high alarm / high clamp
NS.CLONE540.N.A3RA	D	SH	Channel-3 rate alarm
NS.CLONE540.N.H3RA	D		Channel-3 rate alarm handshake
NS.CLONE540.N.A3PR	D	S	Channel-3 bad programming
NS.CLONE540.N.A3CA	D	S	Channel-3 bad calibration
NS.CLONE540.N.A3CT	D	S	Channel-3 invalid channel type configuration
NS.CLONE540.N.A3SR	D	S	Channel-3 invalid source configuration
NS.CLONE540.N.A4UN	D	S	Channel-4 underrange
NS.CLONE540.N.A4OV	D	S	Channel-4 overrange
NS.CLONE540.N.A4LO	D	S	Channel-4 low alarm / low clamp
NS.CLONE540.N.A4HI	D	S	Channel-4 high alarm / high clamp
NS.CLONE540.N.A4RA	D	SH	Channel-4 rate alarm
NS.CLONE540.N.H4RA	D		Channel-4 rate alarm handshake
NS.CLONE540.N.A4PR	D	S	Channel-4 bad programming
NS.CLONE540.N.A4CA	D	S	Channel-4 bad calibration
NS.CLONE540.N.A4CT	D	S	Channel-4 invalid channel type configuration
NS.CLONE540.N.A4SR	D	S	Channel-4 invalid source configuration
NS.CLONE540.N.A5UN	D	S	Channel-5 underrange
NS.CLONE540.N.A5OV	D	S	Channel-5 overrange
NS.CLONE540.N.A5LO	D	S	Channel-5 low alarm / low clamp
NS.CLONE540.N.A5HI	D	S	Channel-5 high alarm / high clamp
NS.CLONE540.N.A5RA	D	SH	Channel-5 rate alarm
NS.CLONE540.N.H5RA	D		Channel-5 rate alarm handshake
NS.CLONE540.N.A5PR	D	S	Channel-5 bad programming
NS.CLONE540.N.A5CA	D	S	Channel-5 bad calibration
NS.CLONE540.N.A5CT	D	S	Channel-5 invalid channel type configuration
NS.CLONE540.N.A5SR	D	S	Channel-5 invalid source configuration
NS.CLONE540.N.A6UN	D	S	Channel-6 underrange
NS.CLONE540.N.A6OV	D	S	Channel-6 overrange
NS.CLONE540.N.A6LO	D	S	Channel-6 low alarm / low clamp
NS.CLONE540.N.A6HI	D	S	Channel-6 high alarm / high clamp
NS.CLONE540.N.A6RA	D	SH	Channel-6 rate alarm
NS.CLONE540.N.H6RA	D		Channel-6 rate alarm handshake
NS.CLONE540.N.A6PR	D	S	Channel-6 bad programming
NS.CLONE540.N.A6CA	D	S	Channel-6 bad calibration
NS.CLONE540.N.A6CT	D	S	Channel-6 invalid channel type configuration
NS.CLONE540.N.A6SR	D	S	Channel-6 invalid source configuration
NS.CLONE540.N.A7UN	D	S	Channel-7 underrange

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display the engineering units for channels 0-7.

Table A.J
Tag Descriptions for N-series Functions Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Integer Structure Continued			
NS.CLONE540.N.A7OV	D	S	Channel-7 overrange
NS.CLONE540.N.A7LO	D	S	Channel-7 low alarm / low clamp
NS.CLONE540.N.A7HI	D	S	Channel-7 high alarm / high clamp
NS.CLONE540.N.A7RA	D	SH	Channel-7 rate alarm
NS.CLONE540.N.H7RA	D		Channel-7 rate alarm handshake
NS.CLONE540.N.A7PR	D	S	Channel-7 bad programming
NS.CLONE540.N.A7CA	D	S	Channel-7 bad calibration
NS.CLONE540.N.A7CT	D	S	Channel-7 invalid channel type configuration
NS.CLONE540.N.A7SR	D	S	Channel-7 invalid source configuration
NS.CLONE540.N.C0T	A		Channel-0 type
NS.CLONE540.N.C1T	A		Channel-1 type
NS.CLONE540.N.C2T	A		Channel-2 type
NS.CLONE540.N.C3T	A		Channel-3 type
NS.CLONE540.N.C4T	A		Channel-4 type
NS.CLONE540.N.C5T	A		Channel-5 type
NS.CLONE540.N.C6T	A		Channel-6 type
NS.CLONE540.N.C7T	A		Channel-7 type
NS.CLONE540.N.I00O	D		Input-0 override status
NS.CLONE540.N.I01O	D		Input-1 override status
NS.CLONE540.N.I02O	D		Input-2 override status
NS.CLONE540.N.I03O	D		Input-3 override status
NS.CLONE540.N.I04O	D		Input-4 override status
NS.CLONE540.N.I05O	D		Input-5 override status
NS.CLONE540.N.I06O	D		Input-6 override status
NS.CLONE540.N.I07O	D		Input-7 override status
NS.CLONE540.N.ICJO	D		Cold junction temperature override status[3]
NS.CLONE540.N.I00U	D		Input 0 engineering units[3]
NS.CLONE540.N.I01U	D		Input 1 engineering units[3]
NS.CLONE540.N.I02U	D		Input 2 engineering units[3]
NS.CLONE540.N.I03U	D		Input 3 engineering units[3]
NS.CLONE540.N.I04U	D		Input 4 engineering units[3]
NS.CLONE540.N.I05U	D		Input 5 engineering units[3]
NS.CLONE540.N.I06U	D		Input 6 engineering units[3]
NS.CLONE540.N.I07U	D		Input 7 engineering units[3]
NS.CLONE540.N.FC	D		Degrees F/Degrees C indicator[3]
NS.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display the engineering units for channels 0-7.

Table A.J
Tag Descriptions for N-series Functions Continued

CV Tag Name:	Type[1]	Alarm[2]	Description:
Tags in Floating Point Structure			
NS.CLONE540.F.C0A	A		Channel-0 actual value
NS.CLONE540.F.C0R	A		Channel-0 resultant value
NS.CLONE540.F.C1A	A		Channel-1 actual value
NS.CLONE540.F.C1R	A		Channel-1 resultant value
NS.CLONE540.F.C2A	A		Channel-2 actual value
NS.CLONE540.F.C2R	A		Channel-2 resultant value
NS.CLONE540.F.C3A	A		Channel-3 actual value
NS.CLONE540.F.C3R	A		Channel-3 resultant value
NS.CLONE540.F.C4A	A		Channel-4 actual value
NS.CLONE540.F.C4R	A		Channel-4 resultant value
NS.CLONE540.F.C5A	A		Channel-5 actual value
NS.CLONE540.F.C5R	A		Channel-5 resultant value
NS.CLONE540.F.C6A	A		Channel-6 actual value
NS.CLONE540.F.C6R	A		Channel-6 resultant value
NS.CLONE540.F.C7A	A		Channel-7 actual value
NS.CLONE540.F.C7R	A		Channel-7 resultant value
NS.CLONE540.F.CJA	A		Cold junction temperature, actual value
NS.CLONE540.F.CJR	A		Cold junction temperature, resultant value

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).
[3]The tag assigned to the enable bit (.STS) will be used to display the function name on the faceplate. The .I00U through .I07U tags and the .FC tag will be used to display the engineering units for channels 0-7.

Table A.K
Tag Descriptions for DD2 Function

CV Tag Name:	Type[1]	Alarm[2]	Description:
DD2.CLONE540.N.AFB0	D	S	Invalid configuration for FB0 feedback: 1 (true), 0 (false).
DD2.CLONE540.N.AFB1	D	S	Invalid configuration for FB1 feedback: 1 (true), 0 (false).
DD2.CLONE540.N.AFLT	D	SH	Fault alarm: 1 (true), 0 (false).
DD2.CLONE540.N.HFLT	D		Fault alarm handshake
DD2.CLONE540.N.AFTM	D	S	Invalid fault time: 1 (true), 0 (false).
DD2.CLONE540.N.AMOD	D	S	Mode alarm: 1 (true), 0 (false).
DD2.CLONE540.N.AOC	D	S	Invalid output configuration: 1 (true), 0 (false).
DD2.CLONE540.N.CMDS	D		Command status.
DD2.CLONE540.N.FB0	D		State of FB0: 1 (on), 0 (off). You may want to monitor this tag when troubleshooting.
DD2.CLONE540.N.FB1	D		State of FB1: 1 (on), 0 (off). You may want to monitor this tag when troubleshooting.
DD2.CLONE540.N.MANR	D		Manual request from ControlView: 1 (true), 0 (false).
DD2.CLONE540.N.MANS	D		Manual mode: 1 (true), 0 (false).
DD2.CLONE540.N.OFF	D		Device off: 1 (true), 0 (false). The On label of this tag contains the text that appears for the off-state feedback legend on the device-driver faceplate. Typical labels are: Closed, Off, and Stopped. You can use this tag to control the color of devices on your custom graphics screen.
DD2.CLONE540.N.OFFR	D		Off request from ControlView: 1 (true), 0 (false).
DD2.CLONE540.N.ON	D		Device on: 1 (true), 0 (false). The On label of this tag contains the text that appears for the on-state feedback legend on the device-driver faceplate. Typical labels are: On, Opened, and Started. You can use this tag to control the color of devices on your custom graphics screen.
DD2.CLONE540.N.ONR	D		On request from ControlView: 1 (true), 0 (false).
DD2.CLONE540.N.OVRS	D		Override mode: 1 (true), 0 (false).
DD2.CLONE540.N.ST0	D		Command status. This tag contains the text for the Off, On, and Initial Value labels that appear for the off-commanded state on the device-driver faceplate. Typical labels are: Close, Off, and Stop.
DD2.CLONE540.N.ST1	D		Command status. This tag contains the text for the Off, On, and Initial Value labels that appear for the on-commanded state on the device-driver faceplate. Typical labels are: On, Open, and Start.
DD2.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
DD2.CLONE540.N.SUPR	D		Supervisory request from ControlView: 1 (true), 0 (false).
DD2.CLONE540.N.SUPS	D		Supervisory mode: 1 (true), 0 (false).

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Table A.L
Tag Descriptions for DD3 Function

CV Tag Name:	Type[1]	Alarm[2]	Description:
DD3.CLONE540.N.AFB0	D	S	Invalid configuration for FB0: 1 (true), 0 (false).
DD3.CLONE540.N.AFB1	D	S	Invalid configuration for FB1: 1 (true), 0 (false).
DD3.CLONE540.N.AFB2	D	S	Invalid configuration for FB2: 1 (true), 0 (false).
DD3.CLONE540.N.AFB3	D	S	Invalid configuration for FB3: 1 (true), 0 (false).
DD3.CLONE540.N.AFLT	D	SH	Fault alarm: 1 (true), 0 (false).
DD3.CLONE540.N.HFLT	D		Fault alarm handshake
DD3.CLONE540.N.AFTM	D	S	Invalid fault time: 1 (true), 0 (false).
DD3.CLONE540.N.AMOD	D	S	Mode alarm: 1 (true), 0 (false).
DD3.CLONE540.N.AOC0	D	S	Invalid output-0 configuration: 1 (true), 0 (false).
DD3.CLONE540.N.AOC1	D	S	Invalid output-1 configuration: 1 (true), 0 (false).
DD3.CLONE540.N.CONS	D		On-command status.
DD3.CLONE540.N.CMDS	D		Mid-Command status.
DD3.CLONE540.N.COFS	D		Off-Command status.
DD3.CLONE540.N.FB0	D		State of FB0: 1 (on), 0 (off). You may want to monitor this tag when troubleshooting.
DD3.CLONE540.N.FB1	D		State of FB1: 1 (on), 0 (off). You may want to monitor this tag when troubleshooting.
DD3.CLONE540.N.FB2	D		State of FB2: 1 (on), 0 (off). You may want to monitor this tag when troubleshooting.
DD3.CLONE540.N.FB3	D		State of FB3: 1 (on), 0 (off). You may want to monitor this tag when troubleshooting.
DD3.CLONE540.N.MANR	D		Manual request from ControlView: 1 (true), 0 (false).
DD3.CLONE540.N.MANS	D		Manual mode: 1 (true), 0 (false).
DD3.CLONE540.N.OFF	D		Device off: 1 (true), 0 (false). The On label of this tag contains the text that appears for the off-state feedback legend on the device-driver faceplate. Typical labels are: Closed, Off, and Stopped. You can use this tag to control the color of devices on your custom graphics screen.
DD3.CLONE540.N.OFFR	D		Off request from ControlView: 1 (true), 0 (false).
DD3.CLONE540.N.MID	D		Device mid: 1 (true), 0 (false). The On label of this tag contains the text that appears for the mid-state feedback legend on the device-driver faceplate. You can use this tag to control the color of devices on your custom graphics screen.
DD3.CLONE540.N.MIDR	D		Mid request from ControlView: 1 (true), 0 (false).
DD3.CLONE540.N.ON	D		Device on: 1 (true), 0 (false). The On label of this tag contains the text that appears for the on-state feedback legend on the device-driver faceplate. Typical labels are: On, Opened, and Started. You can use this tag to control the color of devices on your custom graphics screen.
DD3.CLONE540.N.ONR	D		On request from ControlView: 1 (true), 0 (false).
DD3.CLONE540.N.OVRS	D		Override mode: 1 (true), 0 (false).
DD3.CLONE540.N.ST0	D		Off-command status. This tag contains the text for the Off, On, and Initial Value labels that appear for the off-commanded state on the device-driver faceplate. Typical labels are: Close, Off, and Stop.
DD3.CLONE540.N.ST1	D		Mid-command status. This tag contains the text for the mid label that appears for the mid-commanded state on the device-driver faceplate.
DD3.CLONE540.N.ST2	D		On-command status. This tag contains the text for the Off, On, and Initial Value labels that appear for the on-commanded state on the device-driver faceplate. Typical labels are: On, Open, and Start.
DD3.CLONE540.N.STS	D		Enable: 1 (true), 0 (false). (This tag contains the text for the device name on the faceplate).
DD3.CLONE540.N.SUPR	D		Supervisory request from ControlView: 1 (true), 0 (false).
DD3.CLONE540.N.SUPS	D		Supervisory mode: 1 (true), 0 (false).

[1]Type: A (analog); D (digital).
[2]Alarm: S (suppression only); SH (suppression and handshaking).

Appendix B

Worksheets

This appendix contains worksheets you use to define:

- PID loops
- analog I/O modules
- device drivers

Table B.A lists the worksheets for your convenience.

Make as many photocopies of these worksheets as you need. We recommend that you fill in the copies, not the originals.

Table B.A
PCO Worksheets

Worksheet No.	Worksheet Title
3.1	PID Loop Assignments
4.1	1771-IFE Assignments
4.2	1771-IL Assignments
4.3	1771-IR Assignments
4.4	1771-IXE Assignments
4.5	1771-IXHR Assignments
4.6	1771-QRD Assignments
4.7	1771-OFE Assignments
4.8	N-series Assignments
5.1	DD2 Assignments
5.2	DD3 Assignments

PCO Worksheet 3.1
PID Loop Assignments

Date ________

Page ________

Loop Name				
Integer Data Block Address				
Floating Point Data Block Address				
Description				
PID Loop Enabled (1=Yes/0=No)				
STI/Non-STI (1=STI/0=Non-STI)				
Alternate Update Time (seconds)				
Equation (1=Dependent/0=Independent)				
Control Action (1=Reverse/0=Direct)				
Derivative of (1=Error/0=PV)				
Proportional Gain				
Integral Gain				
Derivative Gain				
Feedforward or Bias				
Deadband				
PV Tracking (1=Yes/0=No)				
Cascade/Ratio Mode Allowed (1=Yes/0=No)				
Master Loop (1=Yes/0=No)				
Slave Loop Data Block File Number (125-998)				
Slave Loop Data Block Element Number (0-920)				
Master Track When Slave Leaves Cascade (1=Yes/0=No)				
Master Track When Slave Enters Cascade (1=Yes/0=No)				
Slave Loop (1=Yes/0=No)				
Master Loop Data Block File Number (125-998)				
Master Loop Data Block Element Number (0-920)				
PV Data Source Selector (1=Analog/0=Alternate)				
PV Module Data Block File Number (125-998)				
PV Module Data Block Element Number (0-999)				
PV Channel Number (0-15)				
PV Minimum Input				
PV Maximum Input				
TB Data Source Selector (1=Analog/0=Alternate)				
TB Module Data Block File Number (125-998)				
TB Module Data Block Element Number (0-999)				
TB Channel Number (0-15)				
TB Minimum Input				
TB Maximum Input				
Ratio Input Data Source Selector (1=Analog/0=Alternate)				
Ratio Input Module Data Block File Number (125-998)				
Ratio Input Module Data Block Element Number (0-999)				

PCO Worksheet 3.1

PID Loop Assignments Continued

Date ________

Page ________

Ratio Input Channel Number (0-15)				
Ratio Input Minimum Input				
Ratio Input Maximum Input				
CV Data Destination Selector (1=Analog/0=Alternate)				
CV Module Data Block File Number (125-998)				
CV Module Data Block Element Number (0-999)				
CV Channel Number (0-15)				
CV Minimum Output Limit				
CV Maximum Output Limit				
Override Value				
PV Alarm Deadband				
Low-Low PV Alarm Limit				
Low PV Alarm Limit				
High PV Alarm Limit				
High-High PV Alarm Limit				
Deviation Alarm Deadband				
Low-Low Deviation Alarm Limit				
Low Deviation Alarm Limit				
High Deviation Alarm Limit				
High-High Deviation Alarm Limit				

PCO Worksheet 4.1
1771-IFE Assignments

Date ________

Page ________

Module Name				
Integer Data Block Address				
Floating Point Data Block Address				
Timer and Block Transfer Element Number				
Description				
Input Type (1=Differential/0=Single-Ended)				
Module Enabled (1=Yes/0=No)				
STI/Non-STI (1=STI/0=Non-STI)				
Rack Number[1]				
Group Number (0-7)				
Slot Number (0-1)				
Real-Time Sample Rate (0-3.1 seconds)				
Filter Time-Constant (0-99)				
Input-0 Range (0-3)[2]				
Input-0 Minimum Scaling Value				
Input-0 Maximum Scaling Value				
Input-0 Override Enable (1=Yes/0=No)				
Input-0 Override Value				
Input-1 Range (0-3)[2]				
Input-1 Minimum Scaling Value				
Input-1 Maximum Scaling Value				
Input-1 Override Enable (1=Yes/0=No)				
Input-1 Override Value				
Input-2 Range (0-3)[2]				
Input-2 Minimum Scaling Value				
Input-2 Maximum Scaling Value				
Input-2 Override Enable (1=Yes/0=No)				
Input-2 Override Value				
Input-3 Range (0-3)[2]				
Input-3 Minimum Scaling Value				
Input-3 Maximum Scaling Value				
Input-3 Override Enable (1=Yes/0=No)				
Input-3 Override Value				
Input-4 Range (0-3)[2]				
Input-4 Minimum Scaling Value				
Input-4 Maximum Scaling Value				
Input-4 Override Enable (1=Yes/0=No)				
Input-4 Override Value				
Input-5 Range (0-3)[2]				
Input-5 Minimum Scaling Value				

PCO Worksheet 4.1
1771-IFE Assignments Continued

Date ________
Page ________

Input-5 Maximum Scaling Value				
Input-5 Override Enable (1=Yes/0=No)				
Input-5 Override Value				
Input-6 Range (0-3)[2]				
Input-6 Minimum Scaling Value				
Input-6 Maximum Scaling Value				
Input-6 Override Enable (1=Yes/0=No)				
Input-6 Override Value				
Input-7 Range (0-3)[2]				
Input-7 Minimum Scaling Value				
Input-7 Maximum Scaling Value				
Input-7 Override Enable (1=Yes/0=No)				
Input-7 Override Value				
Input-8 Range (0-3)[2]				
Input-8 Minimum Scaling Value				
Input-8 Maximum Scaling Value				
Input-8 Override Enable (1=Yes/0=No)				
Input-8 Override Value				
Input-9 Range (0-3)[2]				
Input-9 Minimum Scaling Value				
Input-9 Maximum Scaling Value				
Input-9 Override Enable (1=Yes/0=No)				
Input-9 Override Value				
Input-10 Range (0-3)[2]				
Input-10 Minimum Scaling Value				
Input-10 Maximum Scaling Value				
Input-10 Override Enable (1=Yes/0=No)				
Input-10 Override Value				
Input-11 Range (0-3)[2]				
Input-11 Minimum Scaling Value				
Input-11 Maximum Scaling Value				
Input-11 Override Enable (1=Yes/0=No)				
Input-11 Override Value				
Input-12 Range (0-3)[2]				
Input-12 Minimum Scaling Value				
Input-12 Maximum Scaling Value				
Input-12 Override Enable (1=Yes/0=No)				
Input-12 Override Value				
Input-13 Range (0-3)[2]				
Input-13 Minimum Scaling Value				
Input-13 Maximum Scaling Value				
Input-13 Override Enable (1=Yes/0=No)				
Input-13 Override Value				
Input-14 Range (0-3)[2]				

PCO Worksheet 4.1
1771-IFE Assignments Continued

Date ________

Page ________

Input-14 Minimum Scaling Value				
Input-14 Maximum Scaling Value				
Input-14 Override Enable (1=Yes/0=No)				
Input-14 Override Value				
Input-15 Range (0-3)[2]				
Input-15 Minimum Scaling Value				
Input-15 Maximum Scaling Value				
Input-15 Override Enable (1=Yes/0=No)				
Input-15 Override Value				

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

[2] Input ranges: 0 = 1 to 5V, 4 to 20 mA; 1 = 0 to 5V, 0 to 20 mA; 2 = –5 to +5V, –20 to +20 mA; 3 = –10 to +10V

PCO Worksheet 4.2
1771-IL Assignments

Date ________

Page ________

Module Name				
Integer Data Block Address				
Floating Point Data Block Address				
Timer and Block Transfer Element Number				
Description				
Module Enabled (1=Yes/0=No)				
STI/Non-STI (1=STI/0=Non-STI)				
Rack Number[1]				
Group Number (0-7)				
Slot Number (0-1)				
Real-Time Sample Rate (0-3.1 seconds)				
Filter Time-Constant (0-99)				
Input-0 Range (0-3)[2]				
Input-0 Minimum Scaling Value				
Input-0 Maximum Scaling Value				
Input-0 Override Enable (1=Yes/0=No)				
Input-0 Override Value				
Input-1 Range (0-3)[2]				
Input-1 Minimum Scaling Value				
Input-1 Maximum Scaling Value				
Input-1 Override Enable (1=Yes/0=No)				
Input-1 Override Value				
Input-2 Range (0-3)[2]				
Input-2 Minimum Scaling Value				
Input-2 Maximum Scaling Value				
Input-2 Override Enable (1=Yes/0=No)				
Input-2 Override Value				
Input-3 Range (0-3)[2]				
Input-3 Minimum Scaling Value				
Input-3 Maximum Scaling Value				
Input-3 Override Enable (1=Yes/0=No)				
Input-3 Override Value				
Input-4 Range (0-3)[2]				
Input-4 Minimum Scaling Value				
Input-4 Maximum Scaling Value				
Input-4 Override Enable (1=Yes/0=No)				
Input-4 Override Value				
Input-5 Range (0-3)[2]				
Input-5 Minimum Scaling Value				
Input-5 Maximum Scaling Value				

PCO Worksheet 4.2
1771-IL Assignments Continued

Date ________
Page ________

Input-5 Override Enable (1=Yes/0=No)				
Input-5 Override Value				
Input-6 Range (0-3)[2]				
Input-6 Minimum Scaling Value				
Input-6 Maximum Scaling Value				
Input-6 Override Enable (1=Yes/0=No)				
Input-6 Override Value				
Input-7 Range (0-3)[2]				
Input-7 Minimum Scaling Value				
Input-7 Maximum Scaling Value				
Input-7 Override Enable (1=Yes/0=No)				
Input-7 Override Value				

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.
[2] Input ranges: 0 = 1 to 5V, 4 to 20 mA; 1 = 0 to 5V, 0 to 20 mA; 2 = –5 to +5V, –20 to +20 mA; 3 = –10 to +10V

PCO Worksheet 4.3

1771-IR Assignments

Date ________

Page ________

Module Name				
Integer Data Block Address				
Floating Point Data Block Address				
Timer and Block Transfer Element Number				
Description				
Module Enabled (1=Yes/0=No)				
STI/Non-STI (1=STI/0=Non-STI)				
Rack Number[1]				
Group Number (0-7)				
Slot Number (0-1)				
Unit of Measure (0=°C/1=°F/2=Ohms)				
RTD Type/Ohms Resolution (In °C/°F mode: 0=Platinum/1=Copper In Ohms mode: 0=30mΩ per count/1=10mΩ per count)				
Real-Time Sample Rate (0-3.1 seconds)				
Copper RTD Resistance (9.00-11.00)				
Input-0 Readout in Ohms (1=Yes/0=No)				
Input-1 Readout in Ohms (1=Yes/0=No)				
Input-2 Readout in Ohms (1=Yes/0=No)				
Input-3 Readout in Ohms (1=Yes/0=No)				
Input-4 Readout in Ohms (1=Yes/0=No)				
Input-5 Readout in Ohms (1=Yes/0=No)				
Input-0 Override Enable (1=Yes/0=No)				
Input-0 Override Value				
Input-1 Override Enable (1=Yes/0=No)				
Input-1 Override Value				
Input-2 Override Enable (1=Yes/0=No)				
Input-2 Override Value				
Input-3 Override Enable (1=Yes/0=No)				
Input-3 Override Value				
Input-4 Override Enable (1=Yes/0=No)				
Input-4 Override Value				
Input-5 Override Enable (1=Yes/0=No)				
Input-5 Override Value				

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

PCO Worksheet 4.4

1771-IXE Assignments

Date ________

Page ________

Module Name				
Integer Data Block Address				
Floating Point Data Block Address				
Timer and Block Transfer Element Number				
Description				
Module Enabled (1=Yes/0=No)				
STI/Non-STI (1=STI/0=Non-STI)				
Rack Number[1]				
Group Number (0-7)				
Slot Number (0-1)				
Inputs 0-3 Type (0=mV/1=E/2=J/3=K/4=T/5=R/6=S)				
Inputs 4-7 Type (0=mV/1=E/2=J/3=K/4=T/5=R/6=S)				
Temperature Scale (1=°F/0=°C)				
Real-Time Sample Rate (0-3.1 seconds)				
Input-0 Override Enable (1=Yes/0=No)				
Input-0 Override Value				
Input-0 Alarm Enable (1=Yes/0=No)				
Input-0 Low Alarm Value				
Input-0 High Alarm Value				
Input-1 Override Enable (1=Yes/0=No)				
Input-1 Override Value				
Input-1 Alarm Enable (1=Yes/0=No)				
Input-1 Low Alarm Value				
Input-1 High Alarm Value				
Input-2 Override Enable (1=Yes/0=No)				
Input-2 Override Value				
Input-2 Alarm Enable (1=Yes/0=No)				
Input-2 Low Alarm Value				
Input-2 High Alarm Value				
Input-3 Override Enable (1=Yes/0=No)				
Input-3 Override Value				
Input-3 Alarm Enable (1=Yes/0=No)				
Input-3 Low Alarm Value				
Input-3 High Alarm Value				
Input-4 Override Enable (1=Yes/0=No)				
Input-4 Override Value				
Input-4 Alarm Enable (1=Yes/0=No)				
Input-4 Low Alarm Value				
Input-4 High Alarm Value				
Input-5 Override Enable (1=Yes/0=No)				

PCO Worksheet 4.4

1771-IXE Assignments Continued

Date ________

Page ________

Input-5 Override Value				
Input-5 Alarm Enable (1=Yes/0=No)				
Input-5 Low Alarm Value				
Input-5 High Alarm Value				
Input-6 Override Enable (1=Yes/0=No)				
Input-6 Override Value				
Input-6 Alarm Enable (1=Yes/0=No)				
Input-6 Low Alarm Value				
Input-6 High Alarm Value				
Input-7 Override Enable (1=Yes/0=No)				
Input-7 Override Value				
Input-7 Alarm Enable (1=Yes/0=No)				
Input-7 Low Alarm Value				
Input-7 High Alarm Value				
Cold Junction Override Enable (1=Yes/0=No)				
Cold Junction Override Value				

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

PCO Worksheet 4.5

1771-IXHR Assignments

Date ________

Page ________

Module Name				
Integer Data Block Address				
Floating Point Data Block Address				
Timer and Block Transfer Element Number				
Description				
Module Enabled (1=Yes/0=No)				
STI/Non-STI (1=STI/0=Non-STI)				
Rack Number[1]				
Group Number (0-7)				
Slot Number (0-1)				
Inputs 0-3 Type (0=mV/1=E/2=J/3=K/4=T/5=R/6=S/7=B)				
Inputs 4-7 Type (0=mV/1=E/2=J/3=K/4=T/5=R/6=S/7=B)				
Temperature Scale (1=°F/0=°C)				
Real-Time Sample Rate (0-3.175 seconds)				
Zoom Enable (1=Yes/0=No)				
Inputs 0-3 Zoom Value (–70 to +70)				
Inputs 4-7 Zoom Value (–70 to +70)				
Inputs 0-3 Filter Value (0-127)				
Inputs 4-7 Filter Value (0-127)				
Input-0 Override Enable (1=Yes/0=No)				
Input-0 Override Value				
Input-0 Low Alarm Value				
Input-0 High Alarm Value				
Input-1 Override Enable (1=Yes/0=No)				
Input-1 Override Value				
Input-1 Low Alarm Value				
Input-1 High Alarm Value				
Input-2 Override Enable (1=Yes/0=No)				
Input-2 Override Value				
Input-2 Low Alarm Value				
Input-2 High Alarm Value				
Input-3 Override Enable (1=Yes/0=No)				
Input-3 Override Value				
Input-3 Low Alarm Value				
Input-3 High Alarm Value				
Input-4 Override Enable (1=Yes/0=No)				
Input-4 Override Value				
Input-4 Low Alarm Value				
Input-4 High Alarm Value				
Input-5 Override Enable (1=Yes/0=No)				

PCO Worksheet 4.5
1771-IXHR Assignments Continued

Date ________
Page ________

Input-5 Override Value				
Input-5 Low Alarm Value				
Input-5 High Alarm Value				
Input-6 Override Enable (1=Yes/0=No)				
Input-6 Override Value				
Input-6 Low Alarm Value				
Input-6 High Alarm Value				
Input-7 Override Enable (1=Yes/0=No)				
Input-7 Override Value				
Input-7 Low Alarm Value				
Input-7 High Alarm Value				
Cold Junction Override Enable (1=Yes/0=No)				
Cold Junction Override Value				

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

PCO Worksheet 4.6
1771-QRD Assignments

Date ________

Page ________

Module Name				
Integer Data Block Address				
Floating Point Data Block Address				
Timer and Block Transfer Element Number				
Description				
Module Enabled (1=Yes/0=No)				
STI/Non-STI (1=STI/0=Non-STI)				
Allow Totalizer Resets from ControlView (1=Yes/0=No)				
Rack Number[1]				
Group Number (0-7)				
Slot Number (0-1)				
Input-0 Rate Scaling Value				
Input-0 Total Scaling Value				
Input-0 Rate Override Enable (1=Yes/0=No)				
Input-0 Rate Override Value				
Input-0 Total Override Enable (1=Yes/0=No)				
Input-0 Total Override Value				
Input-1 Rate Scaling Value				
Input-1 Total Scaling Value				
Input-1 Rate Override Enable (1=Yes/0=No)				
Input-1 Rate Override Value				
Input-1 Total Override Enable (1=Yes/0=No)				
Input-1 Total Override Value				
Input-2 Rate Scaling Value				
Input-2 Total Scaling Value				
Input-2 Rate Override Enable (1=Yes/0=No)				
Input-2 Rate Override Value				
Input-2 Total Override Enable (1=Yes/0=No)				
Input-2 Total Override Value				
Input-3 Rate Scaling Value				
Input-3 Total Scaling Value				
Input-3 Rate Override Enable (1=Yes/0=No)				
Input-3 Rate Override Value				
Input-3 Total Override Enable (1=Yes/0=No)				
Input-3 Total Override Value				

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

PCO Worksheet 4.7
1771-OFE Assignments

Date ________

Page ________

Module Name				
Integer Data Block Address				
Floating Point Data Block Address				
Timer and Block Transfer Element Number				
Description				
Module Enabled (1=Yes/0=No)				
STI/Non-STI (1=STI/0=Non-STI)				
Rack Number[1]				
Group Number (0-7)				
Slot Number (0-1)				
Block Transfer Read Mode (1=Continuous/0=On-Demand)				
Output-0 Minimum Scaling Value				
Output-0 Maximum Scaling Value				
Output-0 Data Source Selector (1=PID/0=Alt)				
Output-0 PID Data Block File Number (125-998)				
Output-0 PID Data Block Element Number (0-920)				
Output-1 Minimum Scaling Value				
Output-1 Maximum Scaling Value				
Output-1 Data Source Selector (1=PID/0=Alt)				
Output-1 PID Data Block File Number (125-998)				
Output-1 PID Data Block Element Number (0-920)				
Output-2 Minimum Scaling Value				
Output-2 Maximum Scaling Value				
Output-2 Data Source Selector (1=PID/0=Alt)				
Output-2 PID Data Block File Number (125-998)				
Output-2 PID Data Block Element Number (0-920)				
Output-3 Minimum Scaling Value				
Output-3 Maximum Scaling Value				
Output-3 Data Source Selector (1=PID/0=Alt)				
Output-3 PID Data Block File Number (125-998)				
Output-3 PID Data Block Element Number (0-920)				

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

PCO Worksheet 4.8
N-series Assignments (Part A)

Date ________
Page ________

Module Name	
Integer Data Block Address	
Floating Point Data Block Address	
Description	
N-series Enable (1=Yes/0=No)	
STI/Non-STI Selection (1=STI/0=Non-STI)	
Rack Number[1]	
Group Number (0-7)	
Slot Number (0-1)	
Timer and Block Transfer Element Used	
Real-Time Sample Rate (0, 0.100-10.000 seconds)	
Temperature Scale (1=°F/0=°C)	
Cold Junction Alarm Enable (1=Yes/0=No)	
Cold Junction Override Enable (1=Yes/0=No)	
Cold Junction Override Value	
[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.	

PCO Worksheet 4.8
N-series Assignments (Part B)

Date ________

Page ________

Channel Type	Channel 0	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7
±5 Volt Input Channel Fields								
Input X Override Enable (1=Yes/0=No)								
Input X Override Value								
Input X Minimum Scaling Value								
Input X Maximum Scaling Value								
Input X Filter Time-Constant (0, 0.1-9.9 seconds)								
Input X Alarm Enable (1=Yes/0=No)								
Input X Low Alarm Value								
Input X High Alarm Value								
Input X Rate Alarm Value								
Input X Alarm Deadband								
Thermocouple Input Channel Fields								
Input X Override Enable (1=Yes/0=No)								
Input X Override Value								
Input X Filter Time-Constant (0, 0.1-9.9 seconds)								
Input X Thermocouple Type[1]								
Input X Alarm Enable (1=Yes/0=No)								
Input X Low Alarm Value								
Input X High Alarm Value								
Input X Rate Alarm Value								
Input X Alarm Deadband								
RTD Input Channel Fields								
Input X Override Enable (1=Yes/0=No)								
Input X Override Value								
Input X Filter Time-Constant (0, 0.1-9.9 seconds)								
Input X RTD Type (0-4)[2]								
Input X 10 Ohm Offset (-.99 to +.99)								
Input X Alarm Enable (1=Yes/0=No)								
Input X Low Alarm Value								
Input X High Alarm Value								
Input X Rate Alarm Value								
Input X Alarm Deadband								

PCO Worksheet 4.8

Date ________

N-series Assignments (Part B Continued)

Page ________

Channel Type	Channel 0	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7
±10 Volt Output Channel Fields								
Output X Data Source Selector (1=PID/0=Alternate)								
Output X PID Data Block File Number (125-998)								
Output X PID Data Block Element Number (0-920)								
Output X Minimum Scaling Value								
Output X Maximum Scaling Value								
Output X Alarm Enable (1=Yes/0=No)								
Output X Low Clamp Value								
Output X High Clamp Value								
Output X Ramp Rate Limit (0, 1-200%)								
Output X Reset State (0-3)[3]								
Output X Reset Value								
4-20 mA Output Channel Fields								
Output X Data Source Selector (1=PID/0=Alternate)								
Output X PID Data Block File Number (125-998)								
Output X PID Data Block Element Number (0-920)								
Output X Minimum Scaling Value								
Output X Maximum Scaling Value								
Output X Alarm Enable (1=Yes/0=No)								
Output X Low Clamp Value								
Output X High Clamp Value								
Output X Ramp Rate Limit (0, 1-200%)								
Output X Reset State (0-3)[3]								
Output X Reset Value								

1 0=mv, 1=B, 2=E, 3=J, 4=–K, 5=R, 6=S, 7=T

2 RTD ıypes: 0=Ohms/1=100-Ohm Pt. Eur. Std./2=100-Ohm Pt. U.S. Std./3=10-Ohm Copper/4=120-Ohm Nickel

3 Output Reset State: 0=last state, 1=minimum, 2=maximum, 3=user reset value

PCO Worksheet 5.1

DD2 Assignments

Date ________

Page ________

Device Name				
Integer Data Block Address				
Description				
Device Enabled (1=Yes/0=No)				
FB0 Enabled (1=Yes/0=No)				
FB1 Enabled (1=Yes/0=No)				
FB0 State When On (1=On/0=Off)				
FB0 State When Off (1=On/0=Off)				
FB1 State When On (1=On/0=Off)				
FB1 State When Off (1=On/0=Off)				
Manual And Off On Fault (1=Yes/0=No)				
Override State (1=On/0=Off)				
Output Reversal (1=Yes/0=No)				
Output Rack Number[1]				
Output Group Number (0-7)				
Output Channel Number (0-15)				
FB0 Rack Number[1]				
FB0 Group Number (0-7)				
FB0 Channel Number (0-15)				
FB1 Rack Number [1]				
FB1 Group Number (0-7)				
FB1 Channel Number (0–15)				
Fault Time (0-327 seconds)				

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

PCO Worksheet 5.2 Date ________

DD3 Assignments Page ________

Device Name				
Integer Data Block Address				
Description				
Device Enabled (1=Yes/0=No)				
FB0 Enabled (1=Yes/0=No)				
FB1 Enabled (1=Yes/0=No)				
FB2 Enabled (1=Yes/0=No)				
FB3 Enabled (1=Yes/0=No)				
Output-0 Rack Number[1]				
Output-0 Group Number (0-7)				
Output-0 Channel Number (0-15)				
Output-0 State When On (1=On/0=Off)				
Output-0 State When Mid (1=On/0=Off)				
Output-0 State When Off (1=On/0=Off)				
Output-1 Rack Number[1]				
Output-1 Group Number (0-7)				
Output-1 Channel Number (0-15)				
Output-1 State When On (1=On/0=Off)				
Output-1 State When Mid (1=On/0=Off)				
Output-1 State When Off (1=On/0=Off)				
Override State (2=On/1=Mid/0=Off)				
Manual and Off on Fault (1=Yes/0=No)				
Fault Time (0-327 seconds)				
FB0 Rack Number[1]				
FB0 Group Number (0-7)				
FB0 Channel Number (0-15)				
FB0 State When On (1=On/0=Off)				
FB0 State When Mid (1=On/0=Off)				
FB0 State When Off (1=On/0=Off)				
FB1 Rack Number[1]				
FB1 Group Number (0-7)				
FB1 Channel Number (0-15)				
FB1 State When On (1=On/0=Off)				
FB1 State When Mid (1=On/0=Off)				
FB1 State When Off (1=On/0=Off)				
FB2 Rack Number[1]				
FB2 Group Number (0-7)				
FB2 Channel Number (0-15)				
FB2 State When On (1=On/0=Off)				
FB2 State When Mid (1=On/0=Off)				

PCO Worksheet 5.2

DD3 Assignments Continued

Date ________

Page ________

FB2 State When Off (1=On/0=Off)				
FB3 Rack Number[1]				
FB3 Group Number (0-7)				
FB3 Channel Number (0-15)				
FB3 State When On (1=On/0=Off)				
FB3 State When Mid (1=On/0=Off)				
FB3 State When Off (1=On/0=Off)				

[1] Valid values are: 0 - 7 for PLC-5/30, 0 - 17 (octal) for PLC-5/40, and 0 - 27 (octal) for PLC-5/60 processors.

Appendix C

Data Table Values

This appendix describes the data table values for each PCO function. Table C.A lists the tables by function.

Table C.A
PCO Function Data Tables

For this function:	See these tables:	On page:
PID	Table C.B PID Loop Integer Data Block	C-2
	Table C.C PID Loop Floating Point Data Block	C-10
DD2	Table C.D DD2 Integer Data Block	C-15
DD3	Table C.E DD3 Integer Data Block	C-21
IFE	Table C.F IFE Integer Data Block	C-29
	Table C.G IFE Floating Point Data Block	C-33
OFE	Table C.H OFE Integer Data Block	C-34
	Table C.I OFE Floating Point Data Block	C-38
IL	Table C.J IL Integer Data Block	C-39
	Table C.K IL Floating Point Data Block	C-43
IR	Table C.L IR Integer Data Block	C-44
	Table C.M IR Floating Point Data Block	C-48
IXE	Table C.N IXE Integer Data Block	C-49
	Table C.O IXE Floating Point Data Block	C-54
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PID Data Block Values

The PID function uses both an integer and a floating point data block. Each data block begins with a header that identifies the block as part of the PID function. Table C.B lists the elements in the integer data block; Table C.C lists those in the floating point data block.

Table C.B
PID Loop Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For a PID function, this number must equal 12.
2		**Status word #1**
	0	**PID enable** This bit is set when the PID loop is to be enabled for use. When this bit is off, configuration alarms will still be checked, but no actual control will be performed. By using this bit, you can set up spare PID loops which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The PID function logic will automatically turn off this bit once the new configuration values have been calculated.
	2	**STI/non-STI selection** This bit must be set when this loop is part of a selectable timed interrupt routine.
4		**Status word #2** This element is reserved for internal use and should not be modified.
6		**Mode status** These bits indicate the current mode of the PID loop. Your ladder logic may monitor these bits to determine the mode of the loop.
	0	**Supervisory/non-supervisory mode** This bit is set on when the loop is in supervisory mode and turned off when the loop is in non-supervisory mode. Supervisory mode indicates that the loop's mode (auto, manual, etc.) and setpoint, manual output, and/or ratio multiplier will be determined by the "mode requests from PLC" bits and the supervisory setpoint, manual output, and ratio multiplier values which are modified by your ladder logic. Non-supervisory mode indicates that the loop's mode and values may be modified by the operator, typically from the PID loop faceplate in ControlView.
	2	**Cascade/ratio mode** This bit is set on when the loop is in cascade or ratio mode. Whether the loop is in cascade or ratio is determined by whether or not the loop was configured as a slave loop. When in cascade mode, the loop's setpoint will be set equal to the master loop's output. When in ratio mode, the loop's setpoint will be set equal to the ratio input times the ratio multiplier.

Table C.B
PID Loop Integer Data Block Continued

Element:	Bit:	Description:
6	3	**Auto mode** This bit is set on when the loop is in auto mode. When in auto mode the loop's output is regulated by the PID algorithm to try to maintain the process variable at the setpoint value.
	4	**Manual mode** This bit is set on when the loop is in manual mode. Manual mode indicates that the loop's output will be determined by the manual output value set by the PLC (in supervisory mode) or by the operator (in non-supervisory mode).
	5	**Override mode** This bit is set on when the loop is in override mode. Override mode indicates that the loop's output will be determined by the override value which you configure. Override mode is intended to be used for safe state or interlock conditions. When a loop is in override mode, its output cannot be changed by the operator or by the PLC logic changing the supervisory manual output.
	6	**Hand mode** This bit is set on when the loop is in hand mode. Hand mode indicates that the loop's output will be determined by the tieback value which is read back from a manual/auto station in the field.
	8	**Supervisory SP ramp in progress** This bit is set on when the supervisory setpoint is being ramped by the PID function.
	9	**Non-supervisory SP ramp in progress** This bit is set on when the non-supervisory setpoint is being ramped by the PID function at the request of the operator.
	12	**Deadband in effect** This bit is set when the zero-crossing deadband is preventing the loop's output from changing.
10		**Configuration alarms** These bits are set by the PID logic to indicate a configuration alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in PID data block elements 12, 14, 16, and 18.
	0	**Invalid PV configuration** This bit will be set if the process variable has been configured to receive its value from the output of an analog I/O ,i.e., IFE, function, but the PV module data block file or element number is invalid, or the data block header referenced by the PV module data block file and element number does not indicate a valid analog I/O function block.
	1	**Invalid TB configuration** This bit will be set if the tieback has been configured to receive its value from the output of an analog I/O ,i.e., IFE, function, but the TB module data block file or element number is invalid, or the data block header referenced by the TB module data block file and element number does not indicate a valid analog I/O function block.

Table C.B
PID Loop Integer Data Block Continued

Element:	Bit:	Description:
10	2	**Invalid ratio input configuration** This bit will be set if the ratio input has been configured to receive its value from the output of an analog I/O ,i.e., IFE, function, but the ratio module data block file or element number is invalid, or the data block header referenced by the ratio module data block file and element number does not indicate a valid analog I/O function block.
	3	**Invalid CV configuration** This bit will be set if the control variable has been configured to have its value used by an analog I/O ,i.e., OFE, function, but the CV module data block file or element number is invalid, or the data block header referenced by the CV module data block file and element number does not indicate a valid analog I/O function block.
	4	**Invalid master loop configuration** This bit will be set if the slave loop has been configured to receive its setpoint from the output of another PID function, but the master loop data block file or element number is invalid, or the data block header referenced by the master loop data block file and element number does not indicate a valid PID function block.
	5	**Invalid slave loop configuration** This bit will be set if the master loop has been configured to have its output used as the setpoint of another PID function, but the slave loop data block file or element number is invalid, or the data block header referenced by the slave loop data block file and element number does not indicate a valid PID function block.
	8	**Invalid loop update time** This bit will be set if the loop update time to be used by the PID loop is invalid. Valid loop update time values must be greater than 0.
	9	**SP out of range** This bit will be set if the SP is outside the PV value engineering units minimum and maximum for this loop. If this occurs, the SP value will be set equal to whichever limit the out of range SP violated.
	12	**PV health bad** This bit will be set if the PID function is configured to obtain the PV from an analog input function, and that function is reporting bad health. This will force the loop into manual mode.
	13	**TB health bad** This bit will be set if the PID function is configured to obtain the TB from an analog input function, and that function is reporting bad health.
	14	**Ratio input health bad** This bit will be set if the PID function is configured to obtain the ratio input from an analog input function, and that function is reporting bad health.
	15	**CV health bad** This bit will be set if the PID function is configured to send the CV to an analog output function, and that function is reporting bad health. This will force the loop into manual mode.

Table C.B
PID Loop Integer Data Block Continued

Element:	Bit:	Description:
11		**PID alarms** These bits are set by the PID logic to indicate a PV or deviation alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in PID data block elements 13, 15, 17, and 19.
	0	**PV low-low** This bit is set to indicate that the process variable is less than or equal to the low-low PV alarm limit configured for this loop. Once turned on, this bit will not be turned off until the PV becomes greater than the low-low PV alarm limit plus the PV alarm deadband.
	1-3	**PV low, PV high, PV high-high alarms, respectively**
	4	**Deviation low-low** This bit is set to indicate that the error is less than or equal to the low-low deviation alarm limit configured for this loop. Once turned on, this bit will not be turned off until the error becomes greater than the low-low deviation alarm limit plus the deviation alarm deadband.
	5-7	**Deviation low, deviation high, deviation high-high alarms, respectively**
	14	**Output low limiting in effect** This bit is set to indicate that the output value calculated by the PID algorithm is less than the minimum output limit configured for this loop and has been set equal to the minimum output limit.
	15	**Output high limiting in effect** This bit is set to indicate that the output value calculated by the PID algorithm is greater than the maximum output limit configured for this loop and has been set equal to the maximum output limit.
12, 13		**Configuration and PID alarms result with suppression** These bits show the result of an alarm after undergoing suppression logic. The bit layout in element 12 is the same as used in PID data block element 10. The bit layout in element 13 is the same as used in PID data block element 11.
14,15		**Configuration and PID alarms result with suppression and handshaking** These bits show the result of an alarm after undergoing suppression and handshaking logic. The bit layout in element 14 is the same as used in PID data block element 10. The bit layout in element 15 is the same as used in PID data block element 11.
16, 17		**Configuration and PID alarms suppression** These bits suppress the alarm result bits. The bit layout in element 16 is the same as used in PID data block element 10. The bit layout in element 17 is the same as used in PID data block element 11.

Table C.B
PID Loop Integer Data Block Continued

Element:	Bit:	Description:
18, 19		**Configuration and PID alarms handshake** These bits are set by ControlView when it senses an alarm result bit. The bit layout in element 18 is the same as used in PID data block element 11.
21		**Mode requests from PLC** These bits are set by your PLC logic to change the mode of the loop.
	0	**Supervisory request from PLC** You can set this bit in your PLC logic to put the loop in supervisory mode. When you turn off this bit, the loop will still remain in supervisory mode until requested to go to non-supervisory by your ladder logic setting the non-supervisory request from PLC bit, or by the operator requesting a mode change from the faceplate on ControlView. If you leave this bit always set on, the loop cannot go to non-supervisory mode unless the non-supervisory request from PLC is also on.
	1	**Non-supervisory request from PLC** You can set this bit in your PLC logic to put the loop in non-supervisory mode. When you turn off this bit, the loop will still remain in non-supervisory mode until requested to go to supervisory. If you leave this bit always set on, the loop cannot go to supervisory mode. The non-supervisory request from PLC bit will override the supervisory request from PLC bit.
	2	**Cascade/ratio request from PLC** If the loop is in supervisory mode, you can set this bit in your PLC logic to put the loop in cascade/ratio mode. When you turn off this bit, the loop will still remain in cascade/ratio mode until requested to go to some other mode. If you leave this bit always set on, the loop cannot go to any other mode (although a configuration alarm or loss of PV or CV health will always cause the loop to go to manual mode). A loss of ratio input health will cause a ratio loop in cascade/ratio mode to go to Auto.
	3	**Auto request from PLC** If the loop is in supervisory mode, you can set this bit in your PLC logic to put the loop in auto mode. When you turn off this bit, the loop will still remain in auto mode until requested to go to some other mode. If you leave this bit always set on, the loop cannot go to any other mode (although a configuration alarm or loss of PV or CV health will always cause the loop to go to manual mode). Note that an auto request from PLC will override a cascade/ratio request from PLC.
	4	**Manual request from PLC** If the loop is in supervisory mode, you can set this bit in your PLC logic to put the loop in manual mode. When you turn off this bit, the loop will still remain in manual mode until requested to go to some other mode. If you leave this bit always set on, the loop cannot go to any other mode (except for override or hand modes). Note that a manual request from PLC will override a cascade/ratio or auto request from PLC.

Table C.B
PID Loop Integer Data Block Continued

Element:	Bit:	Description:
21	5	**Override request from PLC** You can set this bit in your PLC logic to put the loop in override mode. When you turn off this bit, the loop will go to manual mode until requested to go to some other mode. If you leave this bit always set on, the loop cannot go to any other mode (except for hand mode). Note that an override request from PLC will override a cascade/ratio, auto, or manual request from PLC or ControlView.
	6	**Hand request from PLC** You can set this bit in your PLC logic to put the loop in hand mode. When you turn off this bit, the loop will go to manual mode until requested to go to some other mode. If you leave this bit always set on, the loop cannot go to any other mode. Note that a hand request from PLC will override a cascade/ratio, auto, manual, or override request from PLC or ControlView.
	8	**Supervisory SP ramp on request** You can set this bit in your PLC logic to start a ramp of the supervisory SP.
	9	**Supervisory SP ramp off request** You can set this bit in your PLC logic to stop a ramp of the supervisory SP. The ramp off request will override the ramp on request.
22		**Mode requests from ControlView** These bits are set by the faceplate display on ControlView to change the mode of the loop.
	0	**Supervisory request from ControlView** The PID loop faceplate will set this bit when the operator requests the loop to go to supervisory mode. The loop logic will automatically reset this bit.
	2	**Cascade/ratio request from ControlView** The PID loop faceplate will set this bit when the operator requests the loop to go to cascade/ratio mode. The loop logic will automatically reset this bit. As long as the supervisory request from PLC is not on, this bit will also place the loop in non-supervisory mode.
	3	**Auto request from ControlView** The PID loop faceplate will set this bit when the operator requests the loop to go to auto mode. The loop logic will automatically reset this bit. As long as the supervisory request from PLC is not on, this bit will also place the loop in non-supervisory mode.
	4	**Manual request from ControlView** The PID loop faceplate will set this bit when the operator requests the loop to go to manual mode. The loop logic will automatically reset this bit. As long as the supervisory request from PLC is not on, this bit will also place the loop in non-supervisory mode.
	8	**Non-supervisory SP ramp on request** The PID loop data entry screen will set this bit when the operator requests a setpoint ramp to start. The loop logic will automatically reset this bit. A non-supervisory SP ramp cannot be started if the loop is in supervisory and/or cascade/ratio mode.

Table C.B
PID Loop Integer Data Block Continued

Element:	Bit:	Description:
22	9	**Non-supervisory SP ramp off request** The PID loop data entry screen will set this bit when the operator requests a setpoint ramp to stop. The loop logic will automatically reset this bit.
24		**PID configuration bits** These bits set up several configuration options for the loop. These bits are normally configured by the PID loop configuration screens on ControlView.
	0	**Equation (0=independent, 1=dependent)** If this bit is off, the PID algorithm will use an independent PID gain equation. If this bit is on, the PID algorithm will use a dependent PID gain equation. When independent is specified, the PID algorithm uses an independent gain equation having the form: $CV_n=CV_{(n-1)} + K_p(E_n - E_{(n-1)}) + K_I E_n \Delta t + (K_D/\Delta t)(E_n - 2E_{(n-1)} + E_{(n-2)} + (BIAS_n - BIAS_{(n-1)}$ When dependent is specified, the PID algorithm uses a dependent gain equation having the form: $CV_n + CV_{(n-1)} + K_C[(E_n - E_{(n-1)}) + (1/T_I)E_n \Delta t + (T_D/\Delta t)(E_n - 2E_{(n-1)} + E_{(n-2)}] + (BIAS_n - BIAS_{(n-1)})$
	1	**Control action (0=direct, 1=reverse)** If this bit is off, the error will be calculated as E=SP-PV. If this bit is on, the error will be calculated as E=PV-SP.
	2	**Derivative of (0=PV, 1=error)** If this bit is off, the derivative term will be calculated using ΔPV. This avoids an output spike on a setpoint change. If this bit is on, the derivative term will be calculated using ΔE.
	3	**PV tracking (0=no, 1=yes)** If this bit is on, the setpoint will track the process variable when the loop is in manual mode.
	4	**Cascade/ratio mode allowed (0=no, 1=yes)** If this bit is off, the loop will not go into cascade/ratio mode. If this bit is on, then cascade/ratio mode is allowed.
	5	**Master loop? (0=no, 1=yes)** If this bit is on, it indicates that this loop is a master loop in a cascaded control scheme.
	6	**Slave loop? (0=no, 1=yes)** If this bit is on, it indicates that this loop is a slave loop in a cascaded control scheme.
	8	**Master track when slave leaves cascade? (0=no, 1=yes)** If this bit is on, it indicates that this master loop will go to manual mode and have its output track the slave loop's setpoint when the slave loop is not in cascade/ratio mode.
	9	**Master track when slave enters cascade? (0=no, 1=yes)** If this bit is on, it indicates that this master loop will go to auto mode when the slave loop enters cascade/ratio mode.

Table C.B
PID Loop Integer Data Block Continued

Element:	Bit:	Description:
26		**Data source selector bits** These bits should be set if the variable's value is to be obtained from (or go to) an analog I/O function. They should be turned off if the channel's output is to be obtained from (or go to) the alternate value.
	0	**PV data source selector bit**
	1	**TB data source selector bit**
	2	**Ratio input data source selector bit**
	3	**CV data destination selector bit**
27		**PV module data block file number** This element contains the configured analog I/O ,i.e., IFE integer data block file number of the analog I/O function which will be used as the data source for the process variable. Valid values are 125-998.
28		**PV module data block element number** This element contains the configured analog I/O data block starting element number of the analog I/O function which will be used as the data source for the process variable. Valid values are 0-999.
29		**PV channel number** This element contains the configured channel number of the analog input module which will be used as the data source of the process variable. Valid values are 0-15.
30-35		**Tieback and ratio input data block file number, element number, and channel number**
36		**CV module data block file number** This element contains the configured analog I/O ,i.e., OFE integer data block file number of the analog I/O function which will use the CV from this PID loop. Valid values are 125-998.
37		**CV module data block element number** This element contains the configured analog I/O data block starting element number of the analog I/O function which will use the CV from this PID loop. Valid values are 0-999.
38		**CV channel number** This element contains the configured channel number of the analog output module which will be used to output the CV from this PID loop. Valid values are 0-3.
39		**Master loop data block file number** This element contains the configured PID integer data block file number of the PID function which is the master loop for this slave loop. Valid values are 125-998.
40		**Master loop data block element number** This element contains the configured PID integer data block starting element number of the PID function which is the master loop for this slave loop. Valid values are 0-920.

Table C.B
PID Loop Integer Data Block Continued

Element:	Bit:	Description:
41		**Slave loop data block file number** This element contains the configured PID integer data block file number of the PID function which is the slave loop for this master loop. Valid values are 125-998.
42		**Slave loop data block element number** This element contains the configured PID integer data block starting element number of the PID function which is the slave loop for this master loop. Valid values are 0-920.
44		**Non-supervisory ramp time (seconds)** This element contains the non-supervisory SP ramp time in seconds that would typically be entered by the operator from the PID data entry display on ControlView. Valid values are 0-32767 seconds.
45		**Supervisory ramp time (seconds)** This element contains the supervisory SP ramp time in seconds. Valid values are 0-32767 seconds.
46-79		**These values are reserved for internal use and should not be modified.**

Table C.C
PID Loop Floating Point Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For a PID function, this number must equal 12.
2		**PV value (engineering units)** Your ladder logic can monitor this value to see the current process variable scaled to engineering units.
3		**TB value (percent)** Your ladder logic can monitor this value to see the current tieback value scaled to the minimum and maximum output limits.
4		**Ratio input value** Your ladder logic can monitor this value to see the current ratio input value scaled to engineering units.
6		**CV value (0-100%)** Your ladder logic can monitor this value to see the current control value scaled to 0-100%.
7		**This value is reserved for internal use and should not be modified.**
9		**SP value** Your ladder logic can monitor this value to see the current setpoint in engineering units.
10		**SP value (% of span)** Your ladder logic can monitor this value to see the current setpoint expressed as a percentage of span.

Table C.C
PID Loop Floating Point Data Block Continued

Element:	Bit:	Description:
11		**Error value (engineering units)** Your ladder logic can monitor this value to see the current error in engineering units.
12		**Ratio multiplier** Your ladder logic can monitor this value to see the current ratio multiplier.
13		**Loop update time (seconds)** Your ladder logic can monitor this value to see the loop update time in seconds.
15-28		**These values are reserved for internal use and should not be modified.**
30		**Non-supervisory setpoint (from ControlView)** This element contains the setpoint requested by the operator, typically from the PID faceplate display in ControlView.
31		**Non-supervisory manual output (from ControlView)** This element contains the manual output requested by the operator, typically from the PID faceplate display in ControlView.
32		**Non-supervisory ratio multiplier (from ControlView)** This element contains the ratio multiplier requested by the operator, typically from the PID data entry display in ControlView.
33		**Non-supervisory SP ramp target (from ControlView)** This element contains the SP ramp target requested by the operator, typically from the PID data entry display in ControlView.
36		**Proportional gain** This element contains the proportional gain (if using the independent gains equation) or the controller gain (if using the dependent gains equation).
37		**Integral gain** This element contains the integral gain in 1/sec (if using the independent gains equation) or the integral time constant in min./repeat (if using the dependent gains equation).
38		**Derivative gain** This element contains the derivative gain in seconds (if using the independent gains equation) or the derivative time constant in minutes (if using the dependent gains equation).
39		**Feedforward or bias** This element contains either the bias for the loop (typically only used in proportional only control) or the feedforward term for the loop. If using feedforward control, your ladder logic should move the result of the feedforward calculations into this element.
40		**Alternate PV value** This value will be used by the PID function as the process variable if the PV data source selector bit is off, indicating that the PV value is not to be obtained from an analog I/O function. In this case, your ladder logic should move the desired PV value into this location.

Table C.C
PID Loop Floating Point Data Block Continued

Element:	Bit:	Description:
41		**Alternate TB value** This value will be used by the PID function as the tieback if the TB data source selector bit is off, indicating that the TB value is not to be obtained from an analog I/O function. In this case, your ladder logic should move the desired TB value into this location.
42		**Alternate ratio input value** This value will be used by the PID function as the ratio input if the ratio input data source selector bit is off, indicating that the ratio input value is not to be obtained from an analog I/O function. In this case, your ladder logic should move the desired ratio input value into this location.
43		**Alternate update time in seconds** This element contains the loop update time (Δt) in milliseconds that the loop will use if it is a non-STI PID loop, and the PV data source selector bit is off, indicating that the PV value is not to be obtained from an analog I/O function.
45		**PV engineering units minimum** This element contains the minimum engineering units value which corresponds to the PV input minimum value.
46		**PV engineering units maximum** This element contains the maximum engineering units value which corresponds to the PV input maximum value.
47		**Tieback engineering units minimum** This element contains the minimum engineering units value which corresponds to the TB input minimum value.
48		**Tieback engineering units maximum** This element contains the maximum engineering units value which corresponds to the TB input maximum value.
49		**Ratio input engineering units minimum** This element contains the minimum engineering units value which corresponds to the ratio input minimum value.
50		**Ratio input engineering units maximum** This element contains the maximum engineering units value which corresponds to the ratio input maximum value.
52		**Deadband** This element contains the zero-crossing deadband for the loop. Setting this value to 0 will disable the deadband. If this value is greater than 0, the loop will control until the error crosses (or becomes equal to) zero. From then on, the output will remain frozen until the error leaves the deadband range.
53		**Minimum output limit** This element contains the minimum output value which can be reached by the controller.
54		**Maximum output limit** This element contains the maximum output value which can be reached by the controller.

Table C.C
PID Loop Floating Point Data Block Continued

Element:	Bit:	Description:
56		**Low-low PV alarm limit** This element contains the low-low PV alarm limit in engineering units. To disable this alarm, set this value to less than the PV engineering units minimum.
57		**Low PV alarm limit** This element contains the low PV alarm limit in engineering units. To disable this alarm, set this value to less than the PV engineering units minimum.
58		**High PV alarm limit** This element contains the high PV alarm limit in engineering units. To disable this alarm, set this value to greater than the PV engineering units maximum.
59		**High-high PV alarm limit** This element contains the high-high PV alarm limit in engineering units. To disable this alarm, set this value to greater than the PV engineering units maximum.
60		**PV alarm deadband** This element contains the PV alarm deadband in engineering units. Setting this value to zero will disable the alarm deadband.
61		**Low-low deviation alarm limit** This element contains the low-low deviation alarm limit in engineering units. Since the deviation alarm works on error, this value should be a negative number. To disable this alarm, set this value to less than the negative of the PV engineering units span.
62		**Low deviation alarm limit** This element contains the low deviation alarm limit in engineering units. Since the deviation alarm works on error, this value should be a negative number. To disable this alarm, set this value to less than the negative of the PV engineering units span.
63		**High deviation alarm limit** This element contains the high deviation alarm limit in engineering units. Since the deviation alarm works on error, this value should be a positive number. To disable this alarm, set this value to greater than the PV engineering units span.
64		**High-high deviation alarm limit** This element contains the high-high deviation alarm limit in engineering units. Since the deviation alarm works on error, this value should be a positive number. To disable this alarm, set this value to greater than the PV engineering units span.
65		**Deviation alarm deadband** This element contains the deviation alarm deadband in engineering units. Setting this value to zero will disable the alarm deadband.
67		**Supervisory setpoint** Your ladder logic should move the desired supervisory setpoint value in engineering units into this location. This value will only be used when the loop is in supervisory mode.

Table C.C
PID Loop Floating Point Data Block Continued

Element:	Bit:	Description:
68		**Supervisory manual output** Your ladder logic should move the desired supervisory manual output value in percent into this location. This value will only be used when the loop is in supervisory mode.
69		**Supervisory SP ramp target** Your ladder logic should move the desired supervisory setpoint ramp target value in engineering units into this location.
70		**Supervisory ratio multiplier** Your ladder logic should move the desired supervisory ratio multiplier value into this location. This value will only be used when the loop is in supervisory mode.
71		**Override value** This element contains the configured override value for this loop. This value will be used as the output when the loop is in override mode.
72-79		**These values are reserved for internal use and should not be modified.**

Two-State Device Driver Data Block Values

The two-state device driver function uses a single data block of type integer. The data block begins with a header that identifies the block as part of the two-state device driver function. Table C.D explains the elements in the integer data block.

Table C.D
Two-State Device Driver Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For a two-state device driver, this number must equal 14.
3		**Status word #1**
	0	**Device enable** This bit is set when the device driver is to be enabled for use. When this bit is off, configuration alarms will still be checked, but no actual control will be performed. By using this bit, you can set up spare two-state devices which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The two-state device logic will automatically turn off this bit once the new configuration values have been calculated.
4		**Status word #2**
	0-2	**These bits are reserved for internal use and should not be modified.**
	6	**Device on** This bit is set on when the device is both commanded to turn on, and the feedbacks match the commanded state. Your ladder logic can monitor this bit to see if a device is on.
	7	**Device off** This bit is set on when the device is both commanded to turn off, and the feedbacks match the commanded state. Your ladder logic can monitor this bit to see if a device is off.
	8	**Supervisory mode** This bit is set on when the device is in supervisory mode. Supervisory mode indicates that the device's commanded state (on or off) will be determined by the supervisory command bit set by your ladder logic.
	9	**Manual mode** This bit is set on when the device is in manual mode. Manual mode indicates that the device's commanded state (on or off) will be determined by the operator's input.
	10	**Override mode** This bit is set on when the device is in override mode. Override mode indicates that the device's commanded state (on or off) will be determined by the override state bit which you configure. Override mode is intended to be used for safe state or interlock conditions. When a device is in override mode, its state cannot be changed by the operator or by the PLC logic changing the supervisory command bit.

Table C.D
Two-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
4	12	**Command status** This bit is set on when the device is commanded to turn on and set off when the device is commanded to turn off. You may monitor this bit to determine the currently commanded state of the device. Note that this may not equal the actual state of the device according to the feedbacks.
	14	**FB0** This bit reflects the actual state of the zero-state feedback input.
	15	**FB1** This bit reflects the actual state of the one-state feedback input.
6		**This word is used internally by the device driver.**
7		**Device driver alarms** These bits are set by the device driver logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in device driver data block elements 8, 9, and 10.
	0	**Fault alarm** This bit is set in two instances: 1. The device has been commanded to go to a state, the fault time has expired, and the feedbacks still do not indicate that the commanded state has been reached. 2. According to the feedbacks, the device suddenly leaves a state without being commanded to do so.
	1	**Mode alarm** This bit is set if the device is in manual mode and receives a supervisory command bit from the PLC logic requesting it to go to a state which is different from the current state. This alarm is meant as a reminder to indicate that a device has been left in manual mode.
	9	**Invalid output configuration** This bit is set if the output channel has been configured with an invalid rack number, group number, or channel number.
	11	**Invalid FB0 configuration** This bit will be set if the zero-state feedback has been configured with an invalid rack, group, or channel number.
	12	**Invalid FB1 configuration** This bit will be set if the one-state feedback has been configured with an invalid rack, group, or channel number.
	15	**Invalid fault time** This bit will be set if the fault time has been configured with an invalid time. Valid time ranges are 0-327 seconds.

Table C.D
Two-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
8		**Device driver alarms result with suppression** These bits show the result of an alarm after undergoing suppression logic. The bit layout in this element is the same as used in device driver data block element 7.
9		**Device driver alarms result with suppression and handshaking** These bits show the result of an alarm after undergoing suppression and handshaking logic. The bit layout in this element is the same as used in device driver data block element 7.
10		**Device driver alarms suppression** These bits suppress the corresponding alarm result bits in elements 8 and 9. The bit layout in this element is the same as used in device driver data block element 7.
11		**Device driver alarms handshake** These bits are set by ControlView when it senses an alarm result bit.
13		**Device driver mode requests** These bits are set by your PLC logic or by ControlView to change the mode or commanded state of the device.
	0	**Supervisory request from PLC processor** You can set this bit in your PLC logic to put the device in supervisory mode. When you turn off this bit, the device will still remain in supervisory mode until requested to go to manual. If you leave this bit always set on, the device cannot go to manual mode unless the manual request from PLC is also on.
	1	**Manual request from PLC processor** You can set this bit in your PLC logic to put the device in manual mode. When you turn off this bit, the device will still remain in manual mode until requested to go to supervisory. If you leave this bit always set on, the device cannot go to supervisory mode. The manual request from PLC bit will override the supervisory request from PLC bit.
	2	**Override request from PLC processor** You can set this bit in your PLC logic to put the device in override mode. Override mode will force the device to the override state regardless of what the operator or PLC logic tries to do. The device will remain in override mode until the override request from PLC processor turned off. At that time, the device will return to manual unless the supervisory request from PLC processor is on, in which case the device will go to supervisory mode.

Table C.D
Two-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
13	4	**Supervisory command bit** If the device is in supervisory mode, the device's commanded state will be determined by the state of the supervisory command bit. When in supervisory mode, your PLC logic can set this bit on to turn on the device or turn this bit off to turn off the device.
	8	**Supervisory request from ControlView** The device driver faceplate will set this bit when the operator requests the device to go to supervisory mode. The device logic will automatically reset this bit.
	9	**Manual request from ControlView** The device driver faceplate will set this bit when the operator requests the device to go to manual mode. The device logic will automatically reset this bit. The device can only go to manual if the supervisory request from PLC bit is not on.
	12	**On request from ControlView** The device driver faceplate will set this bit when the operator requests the device to turn on. The device logic will automatically reset this bit. This bit only has effect if the device is in manual mode.
	14	**Off request from ControlView** The device driver faceplate will set this bit when the operator requests the device to turn off. The device logic will automatically reset this bit. This bit only has effect if the device is in manual mode.
14		**Device driver configuration bits** These bits specify the configuration of the device driver function. These bits are all set by the device driver configuration screen on ControlView.
	0	**FB0 enabled** This bit is set to indicate that this device has a zero-state feedback.
	1	**FB1 enabled** This bit is set to indicate that this device has a one-state feedback.
	4	**FB0 state when on** This bit is configured to indicate the value which FB0 should return when the device turns on. A 1 indicates that FB0 should be true when the device turns on, and a 0 indicates that FB0 should be false when the device turns on.
	5	**FB0 state when off** This bit is configured to indicate the value which FB0 should return when the device turns off. A 1 indicates that FB0 should be true when the device turns off, and a 0 indicates that FB0 should be false when the device turns off.
	6	**FB1 state when on** This bit is configured to indicate the value which FB1 should return when the device turns on. A 1 indicates that FB1 should be true when the device turns on, and a 0 indicates that FB1 should be false when the device turns on.

Table C.D
Two-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
14	7	**FB1 state when off** This bit is configured to indicate the value which FB1 should return when the device turns off. A 1 indicates that FB1 should be true when the device turns off, and a 0 indicates that FB1 should be false when the device turns off.
	8	**Manual & off on fault** If set on, this bit indicates that the device should automatically go to manual and turn off if a fault alarm occurs.
	9	**Override state** This bit is configured to indicate the state to which the device will go if the device is placed in override mode.
	10	**Output reversal** If set on, this bit indicates that the device logic will NOT the output from the device. This is intended to be used with reverse acting solenoid valves so that the faceplate display for a reverse acting valve would look just like the display for a direct acting valve.
16		**Output rack number** This element contains the configured rack number of the digital output used by the device. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
17		**Output group number** This element contains the configured group number of the digital output used by the device. Valid values are 0-7.
18		**Output channel number** This element contains the configured channel number of the digital input used by the device. Valid values are 0-15.
19		**FB0 rack number** This element contains the configured rack number of the zero-state feedback used by the device. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
20		**FB0 group number** This element contains the configured group number of the zero-state feedback used by the device. Valid values are 0-7.
21		**FB0 channel number** This element contains the configured channel number of the zero-state feedback used by the device. Valid values are 0-15.
22		**FB1 rack number** This element contains the configured rack number of the one-state feedback used by the device. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
23		**FB1 group number** This element contains the configured group number of the one-state feedback used by the device. Valid values are 0-7.

Table C.D
Two-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
24		**FB1 channel number** This element contains the configured channel number of the one-state feedback used by the device. Valid values are 0-15.
25		**Fault time (seconds)** This element contains the fault time preset to be used by the device. Valid values are 0-327 seconds.
26-39		**These values are reserved for internal use and should not be modified.**

Three-State Device Driver Data Block Values

The three-state device driver function uses a single integer data block. The data block begins with a header that identifies the block as part of the three-state device driver function. Table C.E explains the elements in the integer data block.

Table C.E
Three-State Device Driver Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For a three-state device driver, this number must equal 15.
3		**Status word #1**
	0	**Device enable** This bit is set when the device driver is to be enabled for use. When this bit is off, configuration alarms will still be checked, but no actual control will be performed. By using this bit, you can set up spare three-state devices which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The three-state device logic will automatically turn off this bit once the new configuration values have been calculated.
4		**Status word #2**
	0-3	**These bits are reserved for internal use and should not be modified.**
	8	**Supervisory mode** This bit is set on when the device is in supervisory mode. Supervisory mode indicates that the device's commanded state (on or off) will be determined by the supervisory command bit set by your ladder logic.
	9	**Manual mode** This bit is set on when the device is in manual mode. Manual mode indicates that the device's commanded state (on or off) will be determined by the operator's input.
	10	**Override mode** This bit is set on when the device is in override mode. Override mode indicates that the device's commanded state (on or off) will be determined by the override state bit which you configure. Override mode is intended to be used for safe state or interlock conditions. When a device is in override mode, its state cannot be changed by the operator or by the PLC logic changing the supervisory command bit.
	13	**On command status** This bit is set on when the device is commanded to turn on and set off when the device is commanded to mid or off. You may monitor this bit to determine if the device is currently commanded on. Note that this may not equal the actual state of the device according to the feedbacks.

Table C.E
Three-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
4	14	**Mid command status** This bit is set on when the device is commanded to mid and set off when the device is commanded to on or off. You may monitor this bit to determine if the device is currently commanded mid. Note that this may not equal the actual state of the device according to the feedbacks.
	15	**Off command status** This bit is set on when the device is commanded to turn off and set off when the device is commanded to on or mid. You may monitor this bit to determine if the device is currently commanded off. Note that this may not equal the actual state of the device according to the feedbacks.
5		**Feedback status**
	0	**FB0** This bit reflects the actual state of the FB0 input.
	1	**FB1** This bit reflects the actual state of the FB1 input.
	2	**FB2** This bit reflects the actual state of the FB2 input.
	3	**FB3** This bit reflects the actual state of the FB3 input.
	5	**Device on** This bit is set on when the device is both commanded to turn on, and the feedbacks match the commanded state. Your ladder logic can monitor this bit to see if a device is on.
	6	**Device mid** This bit is set on when the device is both commanded to turn mid, and the feedbacks match the commanded state. Your ladder logic can monitor this bit to see if a device is mid.
	7	**Device off** This bit is set on when the device is both commanded to turn off, and the feedbacks match the commanded state. Your ladder logic can monitor this bit to see if a device is off.
7		**This word is used internally by the device driver.**
8		**Device driver alarms** These bits are set by the device driver logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in device driver data block elements 9, 10, 11, and 12.
	0	**Fault alarm** This bit is set in two instances: 1. The device has been commanded to go to a state, the fault time has expired, and the feedbacks still do not indicate that the commanded state has been reached. 2. According to the feedbacks, the device suddenly leaves a state without being commanded to do so.

Table C.E
Three-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
8	1	**Mode alarm** This bit is set if the device is in manual mode and receives a supervisory command bit from the PLC logic requesting it to go to a state which is different from the current state. This alarm is meant as a reminder to indicate that a device has been left in manual mode.
	9	**Invalid output 0 configuration** This bit is set if output channel 0 has been configured with an invalid rack number, group number, or channel number.
	10	**Invalid output 1 configuration** This bit is set if output channel 1 has been configured with an invalid rack number, group number, or channel number.
	11	**Invalid FB0 configuration** This bit will be set if FB0 has been configured with an invalid rack, group, or channel number.
	12	**Invalid FB1 configuration** This bit will be set if the FB1 has been configured with an invalid rack, group, or channel number.
	13	**Invalid FB2 configuration** This bit will be set if the FB2 has been configured with an invalid rack, group, or channel number.
	14	**Invalid FB3 configuration** This bit will be set if the FB3 has been configured with an invalid rack, group, or channel number.
	15	**Invalid fault time** This bit will be set if the fault time has been configured with an invalid time. Valid time ranges are 0-327 seconds.
9		**Device driver alarms result with suppression but without handshake** These bits show the result of an alarm after undergoing suppression logic. The bit layout in this element is the same as used in device driver data block element 8.
10		**Device driver alarms result with suppression and handshaking** These bits show the result of an alarm after undergoing suppression and handshaking logic. The bit layout in this element is the same as used in device driver data block element 8.
11		**Device driver alarms suppression** These bits suppress the corresponding alarm result bits in elements 8 and 9. The bit layout in this element is the same as used in device driver data block element 8.

Table C.E
Three-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
12		**Device driver alarms handshake** These bits are set by ControlView when it senses an alarm result bit. The bit layout in this element is the same as used in device driver data block element 8.
14		**Device driver mode requests** These bits are set by your PLC logic or by ControlView to change the mode or commanded state of the device.
	0	**Supervisory request from PLC processor** You can set this bit in your PLC logic to put the device in supervisory mode. When you turn off this bit, the device will still remain in supervisory mode until requested to go to manual. If you leave this bit always set on, the device cannot go to manual mode unless the manual request from PLC processor is also on.
	1	**Manual request from PLC processor** You can set this bit in your PLC logic to put the device in manual mode. When you turn off this bit, the device will still remain in manual mode until requested to go to supervisory. If you leave this bit always set on, the device cannot go to supervisory mode. The manual request from PLC bit will override the supervisory request from PLC bit.
	2	**Override request from PLC processor** You can set this bit in your PLC logic to put the device in override mode. Override mode will force the device to the override state regardless of what the operator or PLC logic tries to do. The device will remain in override mode until the override request from PLC processor turned off. At that time, the device will return to manual unless the supervisory request from PLC processor is on, in which case the device will go to supervisory mode.
	4	**Supervisory on/off command bit** If the device is in supervisory mode, the device's commanded state will be determined by the state of the supervisory command bits. When in supervisory mode, your PLC logic can set this bit on to turn on the device or turn this bit off to turn off the device.
	5	**Supervisory mid/off command bit** If the device is in supervisory mode, the device's commanded state will be determined by the state of the supervisory command bits. When in supervisory mode, your PLC logic can set this bit on to set the device to mid or turn this bit off to turn off the device.
	8	**Supervisory request from ControlView** The device driver faceplate will set this bit when the operator requests the device to go to supervisory mode. The device logic will automatically reset this bit.
	9	**Manual request from ControlView** The device driver faceplate will set this bit when the operator requests the device to go to manual mode. The device logic will automatically reset this bit. The device can only go to manual if the supervisory request from PLC bit is not on.

Table C.E
Three-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
14	12	**On request from ControlView** The device driver faceplate will set this bit when the operator requests the device to turn on. The device logic will automatically reset this bit. This bit only has effect if the device is in manual mode.
	13	**Mid request from ControlView** The device driver faceplate will set this bit when the operator requests the device to turn mid. The device logic will automatically reset this bit. This bit only has effect if the device is in manual mode.
	14	**OFF request from ControlView** The device driver faceplate will set this bit when the operator requests the device to turn off. The device logic will automatically reset this bit. This bit only has effect if the device is in manual mode.
15		**Device driver general configuration bits** These bits specify the general configuration of the device driver. These bits are all set by the device driver configuration screen on ControlView.
	0	**Manual & off on fault** If set on, this bit indicates that the device should automatically go to manual and turn off if a fault alarm occurs.
	4	**Output 0 state when on** This bit is configured to indicate the state output 0 should be placed in when the device is commanded to be on.
	5	**Output 0 state when mid** This bit is configured to indicate the state output 0 should be placed in when the device is commanded to be mid.
	6	**Output 0 state when off** This bit is configured to indicate the state output 0 should be placed in when the device is commanded to be off.
	7	**Output 1 state when on** This bit is configured to indicate the state output 1 should be placed in when the device is commanded to be on.
	8	**Output 1 state when mid** This bit is configured to indicate the state output 1 should be placed in when the device is commanded to be mid.
	9	**Output 1 state when off** This bit is configured to indicate the state output 1 should be placed in when the device is commanded to be off.
16		**Device driver feedback configuration bits** These bits specify the configuration of the device driver feedbacks. These bits are all set by the device driver configuration screen on ControlView.
	0	**FB0 enabled** This bit is set to indicate that this device has an FB0.

Table C.E
Three-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
16	1	**FB1 enabled** This bit is set to indicate that this device has an FB1.
	2	**FB2 enabled** This bit is set to indicate that this device has an FB2.
	3	**FB3 enabled** This bit is set to indicate that this device has an FB3.
	4	**FB0 state when on** This bit is configured to indicate the value which FB0 should return when the device turns on. A 1 indicates that FB0 should be true when the device turns on, and a 0 indicates that FB0 should be false when the device turns on.
	5	**FB0 state when mid** This bit is configured to indicate the value which FB0 should return when the device turns mid. A 1 indicates that FB0 should be true when the device turns mid, and a 0 indicates that FB0 should be false when the device turns mid.
	6	**FB0 state when off** This bit is configured to indicate the value which FB0 should return when the device turns off. A 1 indicates that FB0 should be true when the device turns off, and a 0 indicates that FB0 should be false when the device turns off.
	7	**FB1 state when on** This bit is configured to indicate the value which FB1 should return when the device turns on. A 1 indicates that FB1 should be true when the device turns on, and a 0 indicates that FB1 should be false when the device turns on.
	8	**FB1 state when mid** This bit is configured to indicate the value which FB1 should return when the device turns mid. A 1 indicates that FB1 should be true when the device turns mid, and a 0 indicates that FB1 should be false when the device turns mid.
	9	**FB1 state when off** This bit is configured to indicate the value which FB1 should return when the device turns off. A 1 indicates that FB1 should be true when the device turns off, and a 0 indicates that FB1 should be false when the device turns off.
	10	**FB2 state when on** This bit is configured to indicate the value which FB2 should return when the device turns on. A 1 indicates that FB2 should be true when the device turns on, and a 0 indicates that FB2 should be false when the device turns on.
	11	**FB2 state when mid** This bit is configured to indicate the value which FB2 should return when the device turns mid. A 1 indicates that FB2 should be true when the device turns mid, and a 0 indicates that FB2 should be false when the device turns mid.

Table C.E
Three-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
16	12	**FB2 state when off** This bit is configured to indicate the value which FB2 should return when the device turns off. A 1 indicates that FB2 should be true when the device turns off, and a 0 indicates that FB2 should be false when the device turns off.
	13	**FB3 state when on** This bit is configured to indicate the value which FB3 should return when the device turns on. A 1 indicates that FB3 should be true when the device turns on, and a 0 indicates that FB3 should be false when the device turns on.
	14	**FB3 state when mid** This bit is configured to indicate the value which FB3 should return when the device turns mid. A 1 indicates that FB3 should be true when the device turns mid, and a 0 indicates that FB3 should be false when the device turns mid.
	15	**FB3 state when off** This bit is configured to indicate the value which FB3 should return when the device turns off. A 1 indicates that FB3 should be true when the device turns off, and a 0 indicates that FB3 should be false when the device turns off.
17		**Override state** This element is configured to indicate the state to which the device will go if the device is placed in override mode: 0 = off, 1 = mid, and 2 = on.
19		**Output 0 rack number** This element contains the configured rack number of the digital output used by output 0. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
20		**Output 0 group number** This element contains the configured group number of the digital output used by output 0. Valid values are 0-7.
21		**Output 0 channel number** This element contains the configured channel number of the digital output used by output 0. Valid values are 0-15.
22		**Output 1 rack number** This element contains the configured rack number of the digital output used by output 1. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
23		**Output 1 group number** This element contains the configured group number of the digital output used by output 1. Valid values are 0-7.
24		**Output 1 channel number** This element contains the configured channel number of the digital output used by output 1. Valid values are 0-15.
25		**FB0 rack number** This element contains the configured rack number of the digital input used by FB0. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.

Table C.E
Three-State Device Driver Integer Data Block Continued

Element:	Bit:	Description:
26		**FB0 group number** This element contains the configured group number of the digital input used by FB0. Valid values are 0-7.
27		**FB0 channel number** This element contains the configured channel number of the digital input used by FB0. Valid values are 0-15.
28		**FB1 rack number** This element contains the configured rack number of the digital input used by FB1. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
29		**FB1 group number** This element contains the configured group number of the digital input used by FB1. Valid values are 0-7.
30		**FB1 channel number** This element contains the configured channel number of the digital input used by FB1. Valid values are 0-15.
31		**FB2 rack number** This element contains the configured rack number of the digital input used by FB2. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
32		**FB2 group number** This element contains the configured group number of the digital input used by FB2. Valid values are 0-7.
33		**FB2 channel number** This element contains the configured channel number of the digital input used by FB2. Valid values are 0-15.
34		**FB3 rack number** This element contains the configured rack number of the digital input used by FB3. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
35		**FB3 group number** This element contains the configured group number of the digital input used by FB3. Valid values are 0-7.
36		**FB3 channel number** This element contains the configured channel number of the digital input used by FB3. Valid values are 0-15.
37		**Fault time (seconds)** This element contains the fault time preset to be used by the device. Valid values are 0-327 seconds.
38-59		**These values are reserved for internal use and should not be modified.**

IFE Data Block Values

The IFE function uses both an integer and a floating point data block. Each data block begins with a header that identifies the block as part of the IFE function. Table C.F explains the elements in the integer data block; Table C.G explains these in the floating point data block.

Table C.F
IFE Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IFE function, this number must equal 1.
2		**Rack** This element contains the configured rack location of the 1771-IFE module. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
3		**Group** This element contains the configured module group location of the 1771-IFE module. Valid values are 0-7.
4		**Slot** This element contains the configured slot number of the 1771-IFE module. Valid values are 0 and 1.
5		**BT and timer element used** This element stores the timer element number in file T43 and the block transfer element number in files BT44 and BT45 which will be used by this IFE module. This number must be unique for each analog I/O module. The element number must exist in files T43, BT44, and BT45, or a processor fault may result. Valid values for this element are 0-999.
7		**Status word number 1**
	0	**Module enable** This bit is set when the IFE module is to be enabled for use. When this bit is off, configuration alarms will still be checked, and input override values may still be used, but no actual control will be performed. By using this bit, you can set up spare IFE modules which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The IFE function logic will automatically turn off this bit once the new configuration values have been calculated.
	2	**STI/non-STI selection** This bit must be set when this IFE function is part of a selectable timed interrupt routine.
10, 11		**These values are reserved for internal use and should not be modified.**
12		**Status word number 2**
	1	**This bit is reserved for internal use and should not be modified.**

Table C.F
IFE Integer Data Block Continued

Element:	Bit:	Description:
12	2	**BTR done storage bit** This bit is set on for one program scan when a BTR is completed. You may wish to monitor this bit to trigger any time-based logic using an input from this IFE module (a flow totalization routine, for example).
	3-10	**These bits are reserved for internal use and should not be modified.**
13		**Health bits** These bits may be monitored to determine the health of the input channels. Bit numbers 0-15 correspond to input channels 0-15. A health bit on indicates good health of the channel. The health bit will be turned off if the module is not enabled, there is an invalid RGS configuration, there is an invalid BT file configuration, or there is a block transfer timeout alarm. The PID function monitors these bits to determine whether it is allowable to be in auto mode.
15-17		**These values are reserved for internal use and should not be modified.**
18		**General module alarms** These bits are set by the IFE logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in IFE data block elements 21, 24, 27, and 30.
	1	**Invalid RGS** This bit is set if the module has been configured with an invalid rack number, group number, or slot number.
	2	**Block transfer timeout** In the non-STI version of this function, this bit will be set if the module goes 10 seconds without completing a block transfer and will be turned off once a valid block transfer completes. In the STI version of this function, this bit will be set if block transfer errors are detected in 10 seconds and will not be turned off until the module goes 10 seconds without experiencing another block transfer error.
	3	**RTS timeout** This bit is set to indicate that the IFE module is sampling its inputs faster than the PLC processor can request the data through the block transfer read. This means that data samples are being missed which may cause inaccurate control in the PID function. If this alarm occurs, you should increase your configured RTS time until the alarm clears.
	4	**Invalid BT file configuration** This bit is set if the timer and block transfer control element has been configured to be outside a valid possible range of 0-999.
	8	**Out of range** This bit is set if any of the input signals are at or outside their voltage or amperage range. Since, for example, this bit will turn on if a 4-20 mA input is at 4 mA, it is of very limited usefulness.
	9	**Invalid scaling** This bit will be set if the module returns an invalid scaling alarm.

Table C.F
IFE Integer Data Block Continued

Element:	Bit:	Description:
19		**Channel underrange alarms** The bits in this word will be set if the input signals are at or below their minimum voltage or amperage limit. Since, for example, these bits will turn on if a 4-20 mA input is at 4 mA, they are of very limited usefulness. Bits 0-15 correspond to input channels 0-15. Note that the bit layout in this element is also used in IFE data block elements 22, 25, 28, and 31.
20		**Channel overrange alarms** The bits in this word will be set if the input signals are at or above their maximum voltage or amperage limit. Since, for example, these bits will turn on if a 4-20 mA input is at 20 mA, they are of very limited usefulness. Bits 0-15 correspond to input channels 0-15. Note that the bit layout in this element is also used in IFE data block elements 23, 26, 29, and 32.
21, 22, 23		**General module, underrange, and overrange alarms result without handshake, with suppression, respectively** These bits show the result of an alarm after undergoing suppression logic. The bit layout in element 21 is the same as used in device driver data block element 18. The bit layout in element 22 is the same as used in device driver data block element 19. The bit layout in element 23 is the same as used in device driver data block element 20.
24, 25, 26		**General module, underrange, and overrange alarms result with handshake and suppression, respectively** These bits show the result of an alarm after undergoing handshake and suppression logic. The bit layout in element 24 is the same as used in device driver data block element 18. The bit layout in element 25 is the same as used in device driver data block element 19. The bit layout in element 28 is the same as used in device driver data block element 20.
27, 28, 29		**General module, underrange, and overrange alarms suppression** These bits suppress the alarm result bits. The bit layout in element 27 is the same as used in device driver data block element 18. The bit layout in element 28 is the same as used in device driver data block element 19. The bit layout in element 29 is the same as used in device driver data block element 20.

Table C.F
IFE Integer Data Block Continued

Element:	Bit:	Description:
30, 31, 32		**General module, underrange, and overrange alarms handshake** These bits are set by ControlView when it senses an alarm result bit. The bit layout in element 30 is the same as used in device driver data block element 18. The bit layout in element 31 is the same as used in device driver data block element 19. The bit layout in element 32 is the same as used in device driver data block element 20.
34		**Input override bits** When these bits are set, the IFE function logic will override the selected input value with the configured override value. Bits 0-15 correspond to input channels 0-15.
66-85		**BTR data words** These elements correspond to the BTR file read from the IFE module. Refer to the 1771-IFE User Manual for a complete layout of these data words.
87-89		**BTW data words** These elements correspond to the BTW file sent to the IFE module. The IFE configuration screen on ControlView writes configuration values to these elements (RTS time, filter time constant, input type, input ranges). Note that the internal scaling capabilities of the module are not used for the IFE function. Refer to the 1771-IFE User Manual for a complete layout of these data words.
87	0-1	**Input 0 range** These bits set the range selection for input 0. Valid values are 0-3.
	2-15	**Input 1 range through input 7 range**
88	0-15	**Input 8 range through input 15 range**
89	0-7	**Filter Time constant** These bits set the digital filter time constant for the module. Valid values are 0-99 (two BCD digits).
	8	**Input type single-ended/differential** When set, this bit selects differential inputs. When clear it selects single ended inputs.
	9-10	**Data format** These bits select the module data format. They are always set to select two's complement binary for the IFE function.
	11-15	**Real time sample rate** These bits select the real time sampling rate for the module. Valid values are 0-31 which corresponds to 0-3.1 seconds. This value would normally be set to 0 if this function were used in an STI routine.

**Table C.G
IFE Floating Point Data Block**

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IFE function, this number must equal 1.
2		**RTS time calculated in seconds** This element will display the Real Time Sample (RTS) rate in seconds which was configured for the module.
4		**Input #0 resultant value** The resultant value will either display the actual value, or if an input override is enabled, the resultant value will display the override value.
5-19		**Input #1 resultant value through input #15 resultant value**
21		**Input #0 actual value** The actual value is the raw value from the card scaled by the minimum and maximum scaling values. When the input override is not set, the IFE function will move this value into the resultant value.
22-36		**Input #1 actual value through input #15 actual value**
41		**Input #0 override value** When the input override bit is set, the IFE function logic will move this value into the input #0 resultant value.
42-56		**Input #1 override value through input #15 override value**
58		**Input #0 minimum scaling value** This element contains the value, in engineering units, that is equivalent to the minimum input value from the card.
59-73		**Input #1 though input #15 minimum scaling values**
74		**Input #0 maximum scaling value** This element contains the value, in engineering units, that is equivalent to the maximum input value from the card.
75-89		**Input #1 though input #15 maximum scaling values**

OFE Data Block Values

The OFE function uses both an integer and a floating point data block. Each data block begins with a header that identifies the block as part of the OFE function. Table C.H explains the elements in the integer data block; Table C.I explains those in the floating point data block.

Table C.H
OFE Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an OFE function, this number must equal 9.
2		**Rack** This element contains the configured rack location of the 1771-OFE module. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
3		**Group** This element contains the configured module group location of the 1771-OFE module. Valid values are 0-7.
4		**Slot** This element contains the configured slot number of the 1771-OFE module. Valid values are 0 and 1.
5		**BT and timer element used** This element stores the timer element number in file T43 and the block transfer element number in files BT44 and BT45 which will be used by this OFE module. This number must be unique for each analog I/O module. The element number must exist in files T43, BT44, and BT45, or a processor fault may result. Valid values for this element are 0-999.
7		**Status word number 1**
	0	**Module enable** This bit is set when the OFE module is to be enabled for use. When this bit is off, configuration alarms will still be checked, but no actual control will be performed. By using this bit, you can set up spare OFE modules which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The OFE function logic will automatically turn off this bit once the new configuration values have been calculated.
	2	**STI/non-STI selection** This bit must be set when this OFE function is part of a selectable timed interrupt routine.

Table C.H
OFE Integer Data Block Continued

Element:	Bit:	Description:
7	3	**BTR mode** If this bit is set (continuous mode), the OFE function logic will alternate performing a block transfer read and a block transfer write. If this bit is not set, the OFE function logic will only perform a block transfer read when the PLC processor is started, when an invalid scaling alarm occurs, and when requested by the operator (by setting the BTR request bit). The BTR mode bit should not be turned on (set to continuous mode) if the OFE is used in a STI in conjunction with a PID loop since the output would then only be updated every other STI scan.
	5	**BTR request** This bit can be set to request a BTR be performed from the OFE module when the BTR mode bit is not configured for continuous mode. The operator can set this bit from the OFE faceplate.
12		**Status word number 2** This element is reserved for internal use and should not be modified.
13		**Health bits** These bits may be monitored to determine the health of the output channels. Bit numbers 0-3 correspond to input channels 0-3. A health bit on indicates good health of the channel. The health bit will be turned off if the module is not enabled, there is an invalid RGS configuration, there is an invalid BT file configuration, there is an invalid scaling alarm, there is a block transfer timeout alarm, the channel source is not configured to be a PID loop output, or the data block referenced as a PID loop output is invalid. The PID function monitors these bits to determine whether it is allowable to be in auto mode.
16		**General module alarms** These bits are set by the OFE logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in OFE data block elements 17-20.
	1	**Invalid RGS** This bit is set if the module has been configured with an invalid rack number, group number, or slot number.
	2	**Block transfer timeout** In the non-STI version of this function, this bit will be set if the module goes 10 seconds without completing a block transfer and will be turned off once a valid block transfer completes. In the STI version of this function, this bit will be set if block transfer errors are detected in 10 seconds and will not be turned off until the module goes 10 seconds without experiencing another block transfer error.
	4	**Invalid BT file configuration** This bit is set if the timer and block transfer control element has been configured to be outside a valid possible range of 0-999.

Table C.H
OFE Integer Data Block Continued

Element:	Bit:	Description:
16	8	**Channel 0 invalid scaling** This bit will be set if a value is sent to the OFE card that is outside its configured range. This can happen because there is no way for the OFE function to determine the output range of the card, i.e., 0-10 volts, or −10 to +10 volts. If the card is configured for 0-10 volts, the minimum scaling factor set to 0, and the maximum scaling factor set to 1000, but the user requests −300, an invalid scaling alarm will be received. The same situation with the card configured for −10 to +10 volts would not result in an invalid scaling alarm, because the requested output (−3 volts) is within the card's range.
	9-11	**Channel 1 through channel 3 invalid scaling**
	12	**Channel 0 invalid source configuration** This bit will be set if output channel 0 has been configured to receive its value from the output of a PID function, but the output #0 PID data block file or element number is invalid, or the data block header referenced by the output #0 PID data block file and element number does not equal 12 indicating a PID block.
	13-15	**Channel 1, 2, 3 invalid source configuration**
17		**General module alarms result with suppression, without handshake** These bits show the result of an alarm after undergoing suppression logic. The bit layout in this element is the same as used in device driver data block element 16.
18		**General module alarms result with suppression and handshake** These bits show the result of an alarm after undergoing suppression and handshaking logic. The bit layout in this element is the same as used in device driver data block element 16.
19		**General module alarms suppression** These bits suppress the alarm result bits. The bit layout in this element is the same as used in device driver data block element 16.
20		**General module alarms handshake** These bits are set by ControlView when it senses an alarm result bit. The bit layout in this element is the same as used in device driver data block element 16.
25		**Data source selector bits** These bits should be set if the channel's output is to be obtained from a PID loop. They should be turned off if the channel's output is to be obtained from the alternate value. Bits 0-3 correspond to output channels 0-3.
26		**Output #0 PID data block file number** This element contains the configured PID integer data block file number of the PID function whose output will be used as the data source for output #0. Valid values are 125-998.

Table C.H
OFE Integer Data Block Continued

Element:	Bit:	Description:
27		**Output #0 PID data block element number** This element contains the configured PID data block starting element number of the PID function whose output will be used as the data source for output #0. Valid values are 0-920.
28-33		**Output #1, #2, #3 PID data block file number and element number**
35-44		**These values are reserved for internal use and should not be modified.**
49-53		**BTR data words** These elements correspond to the BTR file read from the OFE module. Refer to the 1771-OFE User Manual for a complete layout of these data words.
49		**Output 0 BT read value**
50		**Output 1 BT read value**
51		**Output 2 BT read value**
52		**Output 3 BT read value**
55-59		**BTW data words** These elements correspond to the BTW file sent to the OFE module. The OFE configuration screen on ControlView writes scaling values to these elements. Refer to the 1771-OFE User Manual for a complete layout of these data words.
55		**Output 0 BT write value**
56		**Output 1 BT write value**
57		**Output 2 BT write value**
58		**Output 3 BT write value**

Table C.I
OFE Floating Point Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an OFE function, this number must equal 9.
4		**Output #0 alternate value** This value will be output by the OFE module if the output #0 data source selector bit is off, indicating that the output value is not to be obtained from a PID loop. In this case, your ladder logic should move the desired output for output channel #0 into this location.
5-7		**Output #1, #2, #3 alternate value, respectively**
13		**Output 0 minimum scaling value** This element contains the value, in engineering units, that is equivalent to the minimum output from the card.
14-16		**Output 1 though output 3 minimum scaling values, respectively**
17		**Output 0 maximum scaling value** This element contains the value, in engineering units, that is equivalent to the maximum output from the card.
18-20		**Output 1 though output 3 maximum scaling values, respectively**
21-59		**Reserved for internal use**

IL Data Block Values

The IL function uses both an integer and a floating point data block. Each data block begins with a header that identifies the block as part of the IL function. Table C.J explains the elements in the integer data block; Table C.K explains those in the floating point data block.

Table C.J
IL Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IL function, this number must equal 2.
2		**Rack** This element contains the configured rack location of the 1771-IL module. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
3		**Group** This element contains the configured module group location of the 1771-IL module. Valid values are 0-7.
4		**Slot** This element contains the configured slot number of the 1771-IL module. Valid values are 0 and 1.
5		**BT and timer element used** This element stores the timer element number in file T43 and the block transfer element number in files BT44 and BT45 which will be used by this IL module. This number must be unique for each analog I/O module. The element number must exist in files T43, BT44, and BT45, or a processor fault may result. Valid values for this element are 0-999.
7		**Status word number 1**
	0	**Module enable** This bit is set when the IL module is to be enabled for use. When this bit is off, configuration alarms will still be checked, and input override values may still be used, but no actual control will be performed. By using this bit, you can set up spare IL modules which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The IL function logic will automatically turn off this bit once the new configuration values have been calculated.
	2	**STI/non-STI selection** This bit must be set when this IL function is part of a selectable timed interrupt routine.
10, 11		**These values are reserved for internal use and should not be modified.**
12		**Status word number 2**
	1	**This bit is reserved for internal use and should not be modified.**

Table C.J
IL Integer Data Block Continued

Element:	Bit:	Description:
12	2	**BTR done storage bit** This bit is set on for one program scan when a BTR is completed. You may wish to monitor this bit to trigger any time-based logic using an input from this IL module (a flow totalization routine, for example).
	3-9	**These bits are reserved for internal use and should not be modified.**
13		**Health bits** These bits may be monitored to determine the health of the input channels. Bit numbers 0-7 correspond to input channels 0-7. A health bit on indicates good health of the channel. The health bit will be turned off if the module is not enabled, there is an invalid RGS configuration, there is an invalid BT file configuration, or there is a block transfer timeout alarm. The PID function monitors these bits to determine whether it is allowable to be in auto mode.
15-16		**These values are reserved for internal use and should not be modified.**
17		**General module alarms** These bits are set by the IL logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in IL data block elements 19, 21, 23, and 25.
	1	**Invalid RGS** This bit is set if the module has been configured with an invalid rack number, group number, or slot number.
	2	**Block transfer timeout** In the non-STI version of this function, this bit will be set if the module goes 10 seconds without completing a block transfer and will be turned off once a valid block transfer completes. In the STI version of this function, this bit will be set if block transfer errors are detected in 10 seconds and will not be turned off until the module goes 10 seconds without experiencing another block transfer error.
	3	**RTS timeout** This bit is set to indicate that the IL module is sampling its inputs faster than the PLC can request the data through the block transfer read. This means that data samples are being missed which may cause inaccurate control in the PID function. If this alarm occurs, you should increase your configured RTS time until the alarm clears.
	4	**Invalid BT file configuration** This bit is set if the timer and block transfer control element has been configured to be outside a valid possible range of 0-999.
	8	**Out of range** This bit is set if any of the input signals are at or outside their voltage or amperage range. Since, for example, this bit will turn on if a 4-20 mA input is at 4 mA, it is of very limited usefulness.
	9	**Invalid scaling** This bit is set if the module returns an invalid scaling alarm.

Table C.J
IL Integer Data Block Continued

Element:	Bit:	Description:
18		**Channel underrange/overrange alarms** Bits 0-7 are the underrange alarms corresponding to inputs 0-7. These bits will be set if the input signals are at or below their minimum voltage or amperage limit. Since, for example, these bits will turn on if a 4-20 mA input is at 4 mA, they are of very limited usefulness. Bits 8-15 are the overrange alarms corresponding to inputs 0-7. These bits will be set if the input signals are at or above their maximum voltage or amperage limit. Since, for example, these bits will turn on if a 4-20 mA input is at 20 mA, they are of very limited usefulness. Note that the bit layout in this element is also used in IL data block elements 20, 22, 24, and 26.
19, 20		**General module and underrange/overrange alarms result without handshake, with suppression** These bits show the result of an alarm after undergoing suppression logic. The bit layout in element 19 is the same as used in IL data block element 17. The bit layout in element 20 is the same as used in IL data block element 18.
21,22		**General module and underrange/overrange alarms result with handshake and suppression** These bits show the result of an alarm after undergoing handshake and suppression logic. The bit layout in element 21 is the same as used in IL data block element 17. The bit layout in element 22 is the same as used in IL data block element 18.
23,24		**General module and underrange/overrange alarms suppression** These bits suppress the alarm result bits. The bit layout in element 23 is the same as used in IL data block element 17. The bit layout in element 24 is the same as used in IL data block element 18.
25,26		**General module and underrange/overrange alarms handshake** These bits are set by ControlView when it senses an alarm result bit. The bit layout in element 25 is the same as used in IL data block element 17. The bit layout in element 26 is the same as used in IL data block element 18.
28		**Input override bits** When these bits are set, the IL function logic will override the selected input value with the configured override value. Bits 0-7 correspond to input channels 0-7.
35-46		**BTR data words** These elements correspond to the BTR file read from the IL module. Refer to the 1771-IL User Manual for a complete layout of these data words.

Table C.J
IL Integer Data Block Continued

Element:	Bit:	Description:
48-49		**BTW data words** These elements correspond to the BTW file sent to the IL module. The IL configuration screen on ControlView writes configuration values to these elements (RTS time, filter time constant, input ranges). Note that the internal scaling capabilities of the module are not used for the IL function. Refer to the 1771-IL User Manual for a complete layout of these data words.
48	0-1	**Input 0 range** These bits set the range selection for input 0. Valid values are 0-3.
	2-15	**Input 1 range through input 7 range**
49	0-7	**Filter Time constant** These bits set the digital filter time constant for the module. Valid values are 0-99 (two BCD digits).
	9-10	**Data format** These bits select the module data format. They are always set to select two's complement binary for the IL function.
	11-15	**Real time sample rate** These bits select the real time sampling rate for the module. Valid values are 0-31 which corresponds to 0-3.1 seconds. This value would normally be set to 0 if this function were used in an STI routine.

Table C.K
IL Floating Point Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IL function, this number must equal 2.
2		**RTS time calculated in seconds** This element will display the Real Time Sample (RTS) rate in seconds which was configured for the module.
4		**Input 0 resultant value** The resultant value will either display the actual value, or if an input override is enabled, the resultant value will display the override value.
5-11		**Input 1 resultant value through input 7 resultant value, respectively**
13		**Input 0 actual value** The actual value is the raw value from the card scaled by the minimum and maximum scaling values.
14-20		**Input 1 actual value through input 7 actual value, respectively**
22		**Input 0 override value** When the input override bit is set, the IL function logic will move this value into the input 0 resultant value.
23-29		**Input 1 override value through input 7 override value, respectively**
31		**Input 0 minimum scaling value** This element contains the value, in engineering units, that is equivalent to the minimum input value from the card.
32-38		**Input 1 though input 7 minimum scaling values, respectively**
39		**Input 0 maximum scaling value** This element contains the value, in engineering units, that is equivalent to the maximum input value from the card.
40-46		**Input 1 though input 7 maximum scaling values, respectively**

IR Data Block Values

The IR function uses both an integer and a floating point data block. Each data block begins with a header that identifies the block as part of the IR function. Table C.L explains the elements in the integer data block; Table C.M explains those in the floating point data block.

Table C.L
IR Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IR function, this number must equal 3.
2		**Rack** This element contains the configured rack location of the 1771-IR module. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
3		**Group** This element contains the configured module group location of the 1771-IR module. Valid values are 0-7.
4		**Slot** This element contains the configured slot number of the 1771-IR module. Valid values are 0 and 1.
5		**BT and timer element used** This element stores the timer element number in file T43 and the block transfer element number in files BT44 and BT45 which will be used by this IR module. This number must be unique for each analog I/O module. The element number must exist in files T43, BT44, and BT45, or a processor fault may result. Valid values for this element are 0-999.
7		**Status word number 1**
	0	**Module enable** This bit is set when the IR module is to be enabled for use. When this bit is off, configuration alarms will still be checked, and input override values may still be used, but no actual control will be performed. By using this bit, you can set up spare IR modules which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The IR function logic will automatically turn off this bit once the new configuration values have been calculated.
	2	**STI/non-STI selection** This bit must be set when this IR function is part of a selectable timed interrupt routine.
10, 11		**These values are reserved for internal use and should not be modified.**
12		**Status word number 2**
	1	**This bit is reserved for internal use and should not be modified.**

Table C.L
IR Integer Data Block Continued

Element:	Bit:	Description:
12	2	**BTR done storage bit** This bit is set on for one program scan when a BTR is completed. You may wish to monitor this bit to trigger any time-based logic using an input from this IR module (a flow totalization routine, for example).
	3-9	**These bits are reserved for internal use and should not be modified.**
13		**Health bits** These bits may be monitored to determine the health of the input channels. Bit numbers 0-5 correspond to input channels 0-5. A health bit on indicates good health of the channel. The health bit will be turned off if the module is not enabled, there is an invalid RGS configuration, there is an invalid BT file configuration, or there is a block transfer timeout alarm. The PID function monitors these bits to determine whether it is allowable to be in auto mode.
15-16		**These values are reserved for internal use and should not be modified.**
17		**General module alarms** These bits are set by the IR logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in IR data block elements 19, 21, 23, and 25.
	1	**Invalid RGS** This bit is set if the module has been configured with an invalid rack number, group number, or slot number.
	2	**Block transfer timeout** In the non-STI version of this function, this bit will be set if the module goes 10 seconds without completing a block transfer and will be turned off once a valid block transfer completes. In the STI version of this function, this bit will be set if block transfer errors are detected in 10 seconds and will not be turned off until the module goes 10 seconds without experiencing another block transfer error.
	3	**RTS timeout** This bit is set to indicate that the IR module is sampling its inputs faster than the PLC processor can request the data through the block transfer read. This means that data samples are being missed which may cause inaccurate control in the PID function. If this alarm occurs, you should increase your configured RTS time until the alarm clears.
	4	**Invalid BT file configuration** This bit is set if the timer and block transfer control element has been configured to be outside a valid possible range of 0-999.
	8	**EEPROM values could not be read** This bit is set if the module could not read the calibration values from the internal EEPROM.

Table C.L
IR Integer Data Block Continued

Element:	Bit:	Description:
18		**Channel underrange/overrange alarms** Bits 0-5 are the underrange alarms corresponding to inputs 0-5. These bits will be set if the input signals are below their minimum input. Bits 8-13 are the overrange alarms corresponding to inputs 0-5. These bits will be set if the input signals are above their maximum input. Note that the bit layout in this element is also used in IR data block elements 20, 22, 24, and 26.
19,20		**General module and underrange/overrange alarms result without handshake, with suppression.** These bits show the result of an alarm after undergoing suppression logic. The bit layout in element 19 is the same as used in IR data block element 17. The bit layout in element 20 is the same as used in IR data block element 18.
21,22		**General module and underrange/overrange alarms result with handshake and suppression.** These bits show the result of an alarm after undergoing handshake and suppression logic. The bit layout in element 21 is the same as used in IR data block element 17. The bit layout in element 22 is the same as used in IR data block element 18.
23,24		**General module and underrange/overrange alarms suppression** These bits suppress the alarm result bits. The bit layout in element 23 is the same as used in IR data block element 17. The bit layout in element 24 is the same as used in IR data block element 18.
25,26		**General module and underrange/overrange alarms handshake** These bits are set by ControlView when it senses an alarm result bit. The bit layout in element 25 is the same as used in IR data block element 17. The bit layout in element 26 is the same as used in IR data block element 18.
28		**Input override bits** When these bits are set, the IR function logic will override the selected input value with the configured override value. Bits 0-5 correspond to input channels 0-5.
35-43		**BTR data words** These elements correspond to the BTR file read from the IR module. Refer to the 1771-IR User Manual for a complete layout of these data words.

Table C.L
IR Integer Data Block Continued

Element:	Bit:	Description:
45-59		**BTW data words** These elements correspond to the BTW file sent to the IR module. The IR configuration screen on ControlView writes configuration values to these elements. Refer to the 1771-IR User Manual for a complete layout of these data words.
45	0	**Input 0 readout in ohms** This bit when set forces the input 0 value to be readout in ohms, independent of the unit of measure configuration.
	1-5	**Inputs 1 though input 5 readout in ohms**
	6-7	**Unit of measure** These bits select the unit of measure for inputs 0-5. Unit of measure / Bit 7 / Bit 6 Degrees C 0 0 Degrees F 0 1 Ohms 1 0 Not used 1 1 Note that the input x readout in ohms bits override this global setting.
	8	**RTD type/ohms resolution** In degrees C or degrees F readout mode, this bit selects platinum (bit 8 = 0) or copper (bit 8 = 1) RTD type. In ohms readout mode, this bit selects 30 milliohms per count (bit 8 = 0) or 10 milliohms per count (bit 8 = 1) resolution.
	9-10	**Data Format** These bits specify the data format for the card. They are always set to select 2's complement binary (bit 9 =1, bit 10 =0).
	11-15	**Real time sample rate** These bits select the real time sampling rate for the module. Valid values are 0-31 which corresponds to 0-3.1 seconds. This value would normally be set to 0 if this function were used in an STI routine.
46		**Copper RTD resistance** When copper RTD is selected, the exact resistance at 25 degrees C must be specified. Format is 4 digit BCD with implied decimal in the middle. Range is 9.00 to 11.00.
47-52		**Channel bias values for inputs 0-5, respectively** These are not used by the IR function.
53-58		**Channel calibration words** These are not used by the IR function.
59		**Auto-calibration request word** This is not used by the IR function.

Table C.M
IR Floating Point Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IR function, this number must equal 3.
2		**RTS time calculated in seconds** This element will display the Real Time Sample (RTS) rate in seconds which was configured for the module.
4		**Input 0 resultant value** The resultant value will either display the actual value, or if an input override is enabled, the resultant value will display the override value.
5-9		**Input 1 resultant value through input 5 resultant value, respectively**
14		**Input 0 actual value** The actual value is the raw value from the card scaled by the minimum and maximum scaling values.
15-19		**Input 1 actual value through input 5 actual value, respectively**
24		**Input 0 override value** When the input override bit is set, the IR function logic will move this value into the input 0 resultant value.
25-29		**Input 1 override value through input 5 override value, respectively**

IXE Data Block Values

The IXE function uses both an integer and a floating point data block. Each data block begins with a header that identifies the block as part of the IXE function. Table C.N explains the elements in the integer data block; Table C.O explains those in the floating point data block.

Table C.N
IXE Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IXE function, this number must equal 4.
2		**Rack** This element contains the configured rack location of the 1771-IXE module. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
3		**Group** This element contains the configured module group location of the 1771-IXE module. Valid values are 0-7.
4		**Slot** This element contains the configured slot number of the 1771-IXE module. Valid values are 0 and 1.
5		**BT and timer element used** This element stores the timer element number in file T43 and the block transfer element number in files BT44 and BT45 which will be used by this IXE module. This number must be unique for each analog I/O module. The element number must exist in files T43, BT44, and BT45, or a processor fault may result. Valid values for this element are 0-999.
7		**Status word number 1**
	0	**Module enable** This bit is set when the IXE module is to be enabled for use. When this bit is off, configuration alarms will still be checked, and input override values may still be used, but no actual control will be performed. By using this bit, you can set up spare IXE modules which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The IXE function logic will automatically turn off this bit once the new configuration values have been calculated.
	2	**STI/non-STI selection** This bit must be set when this IXE function is part of a selectable timed interrupt routine.
10, 11		**These values are reserved for internal use and should not be modified.**
12		**Status word number 2**
	1	**This bit is reserved for internal use and should not be modified.**

Table C.N
IXE Integer Data Block Continued

Element:	Bit:	Description:
12	2	**BTR done storage bit** This bit is set on for one program scan when a BTR is completed. You may wish to monitor this bit to trigger any time-based logic using an input from this IXE module.
	3-9	**These bits are reserved for internal use and should not be modified.**
13		**Health bits** These bits may be monitored to determine the health of the input channels. Bit numbers 0-7 correspond to input channels 0-7. A health bit on indicates good health of the channel. The health bit will be turned off if the module is not enabled, there is an invalid RGS configuration, there is an invalid BT file configuration, or there is a block transfer timeout alarm. The PID function monitors these bits to determine whether it is allowable to be in auto mode.
15-16		**These values are reserved for internal use and should not be modified.**
18		**General module alarms** These bits are set by the IXE logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in IXE data block elements 21, 24, 27, and 30.
	1	**Invalid RGS** This bit is set if the module has been configured with an invalid rack number, group number, or slot number.
	2	**Block transfer timeout** In the non-STI version of this function, this bit will be set if the module goes 10 seconds without completing a block transfer and will be turned off once a valid block transfer completes. In the STI version of this function, this bit will be set if block transfer errors are detected in 10 seconds and will not be turned off until the module goes 10 seconds without experiencing another block transfer error.
	3	**RTS timeout** This bit is set to indicate that the IXE module is sampling its inputs faster than the PLC processor can request the data through the block transfer read. This means that data samples are being missed which may cause inaccurate control in the PID function. If this alarm occurs, you should increase your configured RTS time until the alarm clears.
	4	**Invalid BT file configuration** This bit is set if the timer and block transfer control element has been configured to be outside a valid possible range of 0-999.
	8	**Out of range** This bit is set if any of the input signals are at or outside their voltage or amperage range.
	10	**Low cold junction temperature** This bit is set if the cold junction temperature is below $0^{o}C$ ($32^{o}F$).
	11	**High cold junction temperature** This bit is set if the cold junction temperature is above $60^{o}C$ ($140^{o}F$).

Table C.N
IXE Integer Data Block Continued

Element:	Bit:	Description:
18	12	**EEPROM values could not be read** This bit is set if the module could not read the calibration values from the internal EEPROM.
19		**Channel underrange/overrange alarms** Bits 0-7 are the underrange alarms corresponding to inputs 0-7. These bits will be set if the input signals are below their minimum input. Bits 8-15 are the overrange alarms corresponding to inputs 0-7. These bits will be set if the input signals are above their maximum input. Note that the bit layout in this element is also used in IXE data block elements 22, 25, 28, and 31.
20		**Channel low/high alarms** Bits 0-7 are the low alarms corresponding to inputs 0-7. These bits will be set if the input signals are below their low alarm value. Bits 8-15 are the high alarms corresponding to inputs 0-7. These bits will be set if the input signals are above their high alarm value. Note that the bit layout in this element is also used in IXE data block elements 23, 26, 29, and 32.
21,22,23		**General module, underrange/overrange, and low/high alarms result without handshake, with suppression, respectively** These bits show the result of an alarm after undergoing suppression logic. The bit layout in element 21 is the same as used in IXE data block element 18. The bit layout in element 22 is the same as used in IXE data block element 19. The bit layout in element 23 is the same as used in IXE data block element 20.
24,25,26		**General module, underrange/overrange, and low/high alarms result with handshake and suppression, respectively** These bits show the result of an alarm after undergoing handshake and suppression logic. The bit layout in element 24 is the same as used in IXE data block element 18. The bit layout in element 25 is the same as used in IXE data block element 19. The bit layout in element 26 is the same as used in IXE data block element 20.
27,28,29		**General module, underrange/overrange, and low/high alarms suppression, respectively** These bits suppress the alarm result bits. The bit layout in element 27 is the same as used in IXE data block element 18. The bit layout in element 28 is the same as used in IXE data block element 19. The bit layout in element 29 is the same as used in IXE data block element 20.

Table C.N
IXE Integer Data Block Continued

Element:	Bit:	Description:
30,31,32		**General module, underrange/overrange, and low/high alarms handshake, respectively** These bits are set by ControlView when it senses an alarm result bit. The bit layout in element 30 is the same as used in IXE data block element 18. The bit layout in element 31 is the same as used in IXE data block element 19. The bit layout in element 32 is the same as used in IXE data block element 20.
34		**Input override bits** When these bits are set, the IXE function logic will override the selected input value with the configured override value. Bits 0-7 correspond to input channels 0-7. Bit 8 overrides the cold junction value.
38-50		**BTR data words** These elements correspond to the BTR file read from the IXE module. Refer to the 1771-IXE User Manual for a complete layout of these data words.
52-79		**BTW data words** These elements correspond to the BTW file sent to the IXE module. The IXE configuration screen on ControlView writes configuration values to these elements (RTS time, filter time constants, input types, zoom values, and high/low alarm values). Refer to the 1771-IXE User Manual for a complete layout of these data words.
52	0-2	**Inputs 0-3 type** These bits set the type selection for inputs 0-3. Valid values are 0-6. Type — 2 1 0 Millivolt — 0 0 0 E thermocouple — 0 0 1 J thermocouple — 0 1 0 K thermocouple — 0 1 1 R thermocouple — 1 0 1 S thermocouple — 1 1 0 T thermocouple — 1 0 0
	3-5	**Inputs 4-7 type** These bits set the type selection for inputs 4-7. Valid values are 0-6. Type — 5 4 3 Millivolt — 0 0 0 E thermocouple — 0 0 1 J thermocouple — 0 1 0 K thermocouple — 0 1 1 R thermocouple — 1 0 1 S thermocouple — 1 1 0 T thermocouple — 1 0 0

Element:	Bit:	Description:
52	6	**Input type enable bit** This bit is always set to enable separate type selection for inputs 0-3 and 4-7.
	8	**Temperature scale bit** When set, this bit selects temperature display in degrees F for those channels configured for temperature input.
	9-10	**Data Format** These bits specify the data format for the card. They are always set to select 2's complement binary (bit 9 =1, bit 10 =0).
	11-15	**Real time sample rate** These bits select the real time sampling rate for the module. Valid values are 0-31 which corresponds to 0-3.1 seconds. This value would normally be set to 0 if this function were used in an STI routine.
53	0-7	**Channel alarm enable** These bits enable the low/high channel alarms for each input. When a bit is set, alarm is enabled. Bits 0-7 correspond to inputs 0-7
54	0-7	**Low alarms polarity** These bits specify the low alarm polarity. When a bit is set it indicates a negative alarm value for that channel. Bits 0-7 correspond to inputs 0-7.
	8-15	**High alarms polarity** These bits specify the high alarm polarity. When a bit is set it indicates a negative alarm value for that channel. Bits 8-15 correspond to inputs 0-7.
55		**Input 0 low alarm value** This word contains the low alarm limit value for input 0.
56		**Input 0 high alarm value** This word contains the high alarm limit value for input 0.
57-70		**Input 1 though input 7 low and high alarm values, respectively**
71-78		**Calibration values for inputs 0-7, respectively**
79		**Auto calibration request word**

Table C.O
IXE Floating Point Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IXE function, this number must equal 4.
2		**RTS time calculated in seconds** This element will display the Real Time Sample (RTS) rate in seconds which was configured for the module.
4		**Input 0 resultant value** The resultant value will either display the actual value, or if an input override is enabled, the resultant value will display the override value.
5-11		**Input 1 resultant value through input 7 resultant value, respectively**
12		**Cold junction temperature resultant value**
14		**Input 0 actual value** The actual value is the raw value from the card scaled by the minimum and maximum scaling values.
15-21		**Input 1 actual value through input 7 actual value, respectively**
22		**Cold junction temperature actual value**
24		**Input 0 override value** When the input override bit is set, the IXE function logic will move this value into the input 0 resultant value.
25-31		**Input 1 override value through input 7 override value, respectively**
32		**Cold junction temperature override value**
34		**Input 0 low alarm value** This element contains the input 0 low alarm value.
35		**Input 0 high alarm value** This element contains the input 0 high alarm value.
36-49		**Input 1 though input 7 low and high alarm values, respectively**

IXHR Data Block Values

The IXHR function uses both an integer and a floating point data block. Each data block begins with a header that identifies the block as part of the IXHR function. Table C.P explains the elements in the integer data block; Table C.Q explains those in the floating point data block.

Table C.P
IXHR Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IXHR function, this number must equal 5.
2		**Rack** This element contains the configured rack location of the 1771-IXHR module. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
3		**Group** This element contains the configured module group location of the 1771-IXHR module. Valid values are 0-7.
4		**Slot** This element contains the configured slot number of the 1771-IXHR module. Valid values are 0 and 1.
5		**BT and timer element used** This element stores the timer element number in file T43 and the block transfer element number in files BT44 and BT45 which will be used by this IXHR module. This number must be unique for each analog I/O module. The element number must exist in files T43, BT44, and BT45, or a processor fault may result. Valid values for this element are 0-999.
7		**Status word number 1**
	0	**Module enable** This bit is set when the IXHR module is to be enabled for use. When this bit is off, configuration alarms will still be checked, and input override values may still be used, but no actual control will be performed. By using this bit, you can set up spare IXHR modules which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The IXHR function logic will automatically turn off this bit once the new configuration values have been calculated.
	2	**STI/non-STI selection** This bit must be set when this IXHR function is part of a selectable timed interrupt routine.
10, 11		**These values are reserved for internal use and should not be modified.**
12		**Status word number 2**
	1	**These bit is reserved for internal use and should not be modified.**

Table C.P
IXHR Integer Data Block Continued

Element:	Bit:	Description:
12	2	**BTR done storage bit** This bit is set on for one program scan when a BTR is completed. You may wish to monitor this bit to trigger any time-based logic using an input from this IXHR module (a flow totalization routine, for example).
	3-9	**These bits are reserved for internal use and should not be modified.**
13		**Health bits** These bits may be monitored to determine the health of the input channels. Bit numbers 0-7 correspond to input channels 0-7. A health bit on indicates good health of the channel. The health bit will be turned off if the module is not enabled, there is an invalid RGS configuration, there is an invalid BT file configuration, there is a block transfer timeout alarm, or the input is underrange or overrange. The PID function monitors these bits to determine whether it is allowable to be in auto mode.
15-16		**These values are reserved for internal use and should not be modified.**
18		**General module alarms** These bits are set by the IXHR logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in IXHR data block elements 21, 24, 27, and 30.
	1	**Invalid RGS** This bit is set if the module has been configured with an invalid rack number, group number, or slot number.
	2	**Block transfer timeout** In the non-STI version of this function, this bit will be set if the module goes 10 seconds without completing a block transfer and will be turned off once a valid block transfer completes. In the STI version of this function, this bit will be set if block transfer errors are detected in 10 seconds and will not be turned off until the module goes 10 seconds without experiencing another block transfer error.
	3	**RTS timeout** This bit is set to indicate that the IXHR module is sampling its inputs faster than the PLC processor can request the data through the block transfer read. This means that data samples are being missed which may cause inaccurate control in the PID function. If this alarm occurs, you should increase your configured RTS time until the alarm clears.
	4	**Invalid BT file configuration** This bit is set if the timer and block transfer control element has been configured to be outside a valid possible range of 0-999.
	8	**Out of range** This bit is set if any of the input signals are at or outside their voltage or amperage range.
	10	**Low cold junction temperature** This bit is set if the cold junction temperature is below 0^oC (32^oF).

Table C.P
IXHR Integer Data Block Continued

Element:	Bit:	Description:
18	11	**High cold junction temperature** This bit is set if the cold junction temperature is above 60°C (140°F).
	12	**EEPROM values could not be read** This bit is set if the module could not read the calibration values from the internal EEPROM.
19		**Channel underrange/overrange alarms** Bits 0-7 are the underrange alarms corresponding to inputs 0-7. These bits will be set if the input signals are below their minimum input. Bits 8-15 are the overrange alarms corresponding to inputs 0-7. These bits will be set if the input signals are above their maximum input. Note that the bit layout in this element is also used in IXHR data block elements 22, 25, 28, and 31.
20		**Channel low/high alarms** Bits 0-7 are the low alarms corresponding to inputs 0-7. These bits will be set if the input signals are below their low alarm value. Bits 8-15 are the high alarms corresponding to inputs 0-7. These bits will be set if the input signals are above their high alarm value. Note that the bit layout in this element is also used in IXHR data block elements 23, 26, 29, and 32.
21,22,23		**General module, underrange/overrange, and low/high alarms result without handshake, with suppression, respectively** These bits show the result of an alarm after undergoing suppression logic. The bit layout in element 21 is the same as used in IXHR data block element 18. The bit layout in element 22 is the same as used in IXHR data block element 19. The bit layout in element 23 is the same as used in IXHR data block element 20.
24,25,26		**General module, underrange/overrange, and low/high alarms result with handshake and suppression, respectively** These bits show the result of an alarm after undergoing handshake and suppression logic. The bit layout in element 24 is the same as used in IXHR data block element 18. The bit layout in element 25 is the same as used in IXHR data block element 19. The bit layout in element 26 is the same as used in IXHR data block element 20.
27,28,29		**General module, underrange/overrange, and low/high alarms suppression, respectively** These bits suppress the alarm result bits. The bit layout in element 27 is the same as used in IXHR data block element 18. The bit layout in element 28 is the same as used in IXHR data block element 19. The bit layout in element 29 is the same as used in IXHR data block element 20.

Table C.P
IXHR Integer Data Block Continued

Element:	Bit:	Description:
30,31,32		**General module, underrange/overrange, and low/high alarms handshake, respectively** These bits are set by ControlView when it senses an alarm result bit. The bit layout in element 30 is the same as used in IXHR data block element 18. The bit layout in element 31 is the same as used in IXHR data block element 19. The bit layout in element 32 is the same as used in IXHR data block element 20.
34		**Input override bits** When these bits are set, the IXHR function logic will override the selected input value with the configured override value. Bits 0-7 correspond to input channels 0-7. Bit 8 overrides the cold junction value.
38-50		**BTR data words** These elements correspond to the BTR file read from the IXHR module. Refer to the 1771-IXHR User Manual for a complete layout of these data words.
52-79		**BTW data words** These elements correspond to the BTW file sent to the IXHR module. The IXHR configuration screen on ControlView writes configuration values to these elements (RTS time, filter time constants, input types, zoom values, and high/low alarm values). Refer to the 1771-IXHR User Manual for a complete layout of these data words.
52	0-2	**Inputs 0-3 type** These bits set the type selection for inputs 0-3. Valid values are 0-7. Type — 2 1 0 Millivolt — 0 0 0 B thermocouple — 1 1 1 E thermocouple — 0 0 1 J thermocouple — 0 1 0 K thermocouple — 0 1 1 R thermocouple — 1 0 1 S thermocouple — 1 1 0 T thermocouple — 1 0 0
	3-5	**Inputs 4-7 type** These bits set the type selection for inputs 4-7. Valid values are 0-7. Type — 5 4 3 Millivolt — 0 0 0 B thermocouple — 1 1 1 E thermocouple — 0 0 1 J thermocouple — 0 1 0 K thermocouple — 0 1 1 R thermocouple — 1 0 1 S thermocouple — 1 1 0 T thermocouple — 1 0 0

Table C.P
IXHR Integer Data Block Continued

Element:	Bit:	Description:
52	6	**Input type enable bit** This bit is always set to enable separate type selection for inputs 0-3 and 4-7.
	7	**Zoom enable bit** When set, this bit enables zoom mode for those channels configured for millivolt input.
	8	**Temperature scale bit** When set, this bit selects temperature display in degrees F for those channels configured for temperature input.
	9-15	**Real time sample rate** These bits select the real time sampling rate for the module. Valid values are 0-127 which corresponds to 0-3.175 seconds. This value would normally be set to 0 if this function were used in an STI routine.
53	0-7	**Zoom value for inputs 0-3** These bits set the zoom center value for inputs 0-3 when the zoom enable bit is set. Valid values are –70 to +70.
	8-15	**Zoom value for inputs 4-7** These bits set the zoom center value for inputs 4-7 when the zoom enable bit is set. Valid values are -70 to +70.
54	0-7	**Filter value for inputs 0-3** These bits set the digital filter time constant for inputs 0-3. Valid values are 0-127. Filter time constant is 0.025 (filter value +1). A value of 0 disables the filter.
	8-15	**Filter value for inputs 4-7** These bits set the digital filter time constant for inputs 4-7. Valid values are 0-127. Filter time constant is 0.025 (filter value +1). A value of 0 disables the filter.
55		**Input 0 low alarm value** This word contains the low alarm limit value for input 0.
56		**Input 0 high alarm value** This word contains the high alarm limit value for input 0.
57-70		**Input 1 though input 7 low and high alarm values, respectively**
71-78		**Calibration values for inputs 0-7, respectively**
79		**Auto calibration request word**

Table C.Q
IXHR Floating Point Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an IXHR function, this number must equal 5.
2		**RTS time calculated in seconds** This element will display the Real Time Sample (RTS) rate in seconds which was configured for the module.
4		**Input 0 resultant value** The resultant value will either display the actual value, or if an input override is enabled, the resultant value will display the override value.
5-11		**Input 1 resultant value through input 7 resultant value, respectively**
12		**Cold junction temperature resultant value**
14		**Input 0 actual value** The actual value is the raw value from the card scaled by the minimum and maximum scaling values.
15-21		**Input 1 actual value through input 7 actual value, respectively**
22		**Cold junction temperature actual value**
24		**Input 0 override value** When the input override bit is set, the IXHR function logic will move this value into the input 0 resultant value.
25-31		**Input 1 override value through input 7 override value, respectively**
32		**Cold junction temperature override value**

QRD Data Block Values

The QRD function uses both an integer and a floating point data block. Each data block begins with a header that identifies the block as part of the QRD function. Table C.R explains the elements in the integer data block; Table C.S explains those in the floating point data block.

Table C.R
QRD Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For the QRD function, this number must equal 6.
2		**Rack** This element contains the configured rack location of the 1771-QRD module. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
3		**Group** This element contains the configured module group location of the 1771-QRD module. Valid values are 0-7.
4		**Slot** This element contains the configured slot number of the 1771-QRD module. Valid values are 0 and 1.
5		**BT and timer element used** This element stores the timer element number in file T43 and the block transfer element number in files BT44 and BT45 which will be used by this QRD module. This number must be unique for each analog I/O module. The element number must exist in files T43, BT44, and BT45, or a processor fault may result. Valid values for this element are 0-999.
7		**Status word number 1**
	0	**Module enable** This bit is set when the QRD module is to be enabled for use. When this bit is off, configuration alarms will still be checked, and input override values may still be used, but no actual control will be performed. By using this bit, you can set up spare QRD modules which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The QRD function logic will automatically turn off this bit once the new configuration values have been calculated.
	2	**STI/non-STI selection** This bit must be set when this QRD function is part of a selectable timed interrupt routine.
10, 11		**These values are reserved for internal use and should not be modified.**
12		**Status word number 2**
	1	**This bit is reserved for internal use and should not be modified.**

Table C.R
QRD Integer Data Block Continued

Element:	Bit:	Description:
12	2	**BTR done storage bit** This bit is set on for one program scan when a BTR is completed. You may wish to monitor this bit to trigger any time-based logic using an input from this QRD module.
	3-9	**These bits are reserved for internal use and should not be modified.**
13		**Health bits** These bits may be monitored to determine the health of the input channels. Bit numbers 0-4 correspond to input channels 0-4. A health bit on indicates good health of the channel. The health bit will be turned off if the module is not enabled, there is an invalid RGS configuration, there is an invalid BT file configuration, or there is a block transfer timeout alarm. The PID function monitors these bits to determine whether it is allowable to be in auto mode.
15-16		**These values are reserved for internal use and should not be modified.**
17		**General module alarms** These bits are set by the QRD logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in QRD data block elements 19, 21, 23, and 25.
	1	**Invalid RGS** This bit is set if the module has been configured with an invalid rack number, group number, or slot number.
	2	**Block transfer timeout** In the non-STI version of this function, this bit will be set if the module goes 10 seconds without completing a block transfer and will be turned off once a valid block transfer completes. In the STI version of this function, this bit will be set if block transfer errors are detected in 10 seconds and will not be turned off until the module goes 10 seconds without experiencing another block transfer error.
	4	**Invalid BT file configuration** This bit is set if the timer and block transfer control element has been configured to be outside a valid possible range of 0-999.
18		**Rate channel overrange alarms** The bits in this word will be set when the corresponding input signal rate exceeds 10 kHz. Bit 0-3 correspond to inputs 0-3. Note that the bit layout in this element is also used in QRD elements 20, 22, 24, and 26.
19, 20		**General module and overrange alarms result without handshake, with suppression.** These bits show the result of an alarm after undergoing suppression logic. The bit layout in element 19 is the same as used in QRD data block element 17. The bit layout in element 20 is the same as used in QRD data block element 18.

Table C.R
QRD Integer Data Block Continued

Element:	Bit:	Description:
21, 22		**General module and overrange alarms result with handshake and suppression.** These bits show the result of an alarm after undergoing handshake and suppression logic. The bit layout in element 21 is the same as used in QRD data block element 17. The bit layout in element 22 is the same as used in QRD data block element 18.
23, 24		**General module and overrange alarms suppression** These bits suppress the alarm result bits. The bit layout in element 23 is the same as used in QRD data block element 17. The bit layout in element 24 is the same as used in QRD data block element 18.
25, 26		**General module and overrange alarms handshake** These bits are set by ControlView when it senses an alarm result bit.
28	0	**Input 0 Totalizer reset request from ControlView** This bit, when set via ControlView, will reset the input 0 totalizer if the allow-resets-from-ControlView bit is also set.
	1-3	**Input 1 through input 3 totalizer reset request from ControlView**
	4	**Input 0 totalizer reset from PLC processor** The user's ladder logic can set this bit to reset the input 0 totalizer.
	5-7	**Input 1 through input 3 totalizer reset from PLC processor**
	15	**Allow resets from ControlView** This bit, when set, allows the operator to reset the totalizers via the totalizer-reset-request-from-ControlView bits.
29	0	**Input 0 rate override bit** When this bit is set, the QRD function logic will override the input 0 rate input value with the configured override value.
	1	**Input 0 total override bit** When this bit is set, the QRD function logic will override the input 0 totalizer value with the configured override value.
	2-7	**Input 1 through input 3 rate and total override bits**
31, 32		**Input 0 totalizer storage** These words (in combination with the totalizer on the 1771-QRD card) are use to maintain an accurate total. The counter on the card is the least significant word, Element 32 is the most significant word.
33-38		**Input 1 through input 3 totalizer storage, respectively**

Table C.R
QRD Integer Data Block Continued

Element:	Bit:	Description:
44-52		**BTR data words** These elements correspond to the BTR file read from the QRD module. Refer to the 1771-QRD User Manual for a complete layout of these data words.
54		**BTW data word** This element corresponds to the BTW file sent to the QRD module. Refer to the 1771-QRD User Manual for a complete layout of this data word.

Table C.S
QRD Floating Point Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For the QRD function, this number must equal 6.
4		**Input 0 rate resultant value** The resultant value will either display the actual rate value, or if an input override is enabled, the resultant value will display the override value.
5		**Input 0 total resultant value** The resultant value will either display the actual total value, or if an input override is enable, the resultant value will display the total override value.
6-11		**Input 1 through input 3 rate and total resultant values, respectively**
13		**Input 0 rate actual value** The actual value is the raw value from the card scaled by the rate scaling value.
14		**Input 0 total actual value** The actual value is the raw value from the card actual by the total scaling value.
15-20		**Input 1 through input 3 rate and total actual value, respectively**
22		**Input 0 rate override value** When the input override bit is set, the QRD function logic will move this value into the input 0 rate resultant value.
23		**Input 0 total override value** When the input override bit is set, the QRD function logic will move this value into the input 0 total resultant value.
24-29		**Input 1 through input 3 rate and total override values, respectively**
31		**Input 0 rate scaling value** This element contains the value, in engineering units, that is equivalent to 1 count per second.
32		**Input 0 total scaling value** This element contains the value, in engineering units, that is equivalent to one count.
33-38		**Input 1 though input 3 rate and total scaling values, respectively**

N-series Data Block Values

The N-series functions use both an integer and a floating point data block. Each data block begins with a header that identifies the block as part of the PID function. Table C.T explains the elements in the integer data block; Table C.U explains those in the floating point data block.

Table C.T
N-series Integer Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an N-series function, this number must equal 10.
2		**Rack** This element contains the configured rack location of the 1771 N-series module. Valid values are: 0-7 for PLC-5/30, 0-17 for PLC-5/40, and 0-27 for PLC-5/60 processors.
3		**Group** This element contains the configured module group location of the 1771-N-series module. Valid values are 0-7.
4		**Slot** This element contains the configured slot number of the 1771-N-series module. Valid values are 0 and 1.
5		**BT and timer element used** This element stores the timer element number in file T43 and the block transfer element number in files BT44 and BT45 which will be used by this N-series module. This number must be unique for each analog I/O module. The element number must exist in files T43, BT44, and BT45, or a processor fault may result. Valid values for this element are 0-999.
7		**Status word number 1**
	0	**Module enable** This bit is set when the N-series module is to be enabled for use. When this bit is off, configuration alarms will still be checked, and input override values may still be used, but no actual control will be performed. By using this bit, you can set up spare N-series modules which can later be enabled without having to perform any ladder logic programming.
	1	**Use new values** This bit must be set whenever new configuration values are downloaded. Until this bit is set, new configuration values will not be used. The PCO configuration screens on ControlView automatically set this bit. The N-series function logic will automatically turn off this bit once the new configuration values have been calculated.
	2	**STI/non-STI selection** This bit must be set when this N-series function is part of a selectable timed interrupt routine.
12		**Status word number 2**
	1	**This bit is reserved for internal use and should not be modified.**

Table C.T
N-series Integer Data Block Continued

Element:	Bit:	Description:
12	2	**BTR done storage bit** This bit is set on for one program scan when a BTR is completed. You may wish to monitor this bit to trigger any time-based logic using an input from this N-series module (a flow totalization routine, for example).
	3-10	**These bits are reserved for internal use and should not be modified.**
13		**Health bits** These bits may be monitored to determine the health of the channels. Bit numbers 0-7 correspond to channels 0-7. A health bit on indicates good health of the channel. The health bit will be turned off if the module is not enabled, there is an invalid RGS configuration, there is an invalid BT file configuration, there is a block transfer timeout alarm, or a channel is overrange or underrange. The PID function monitors these bits to determine whether it is allowable to be in auto mode.
24		**General module alarms** These bits are set by the N-series logic to indicate an alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in N-series data block elements 33, 42, 51, and 60.
	1	**Invalid RGS** This bit is set if the module has been configured with an invalid rack number, group number, or slot number.
	2	**Block transfer timeout** In the non-STI version of this function, this bit will be set if the module goes 10 seconds without completing a block transfer and will be turned off once a valid block transfer completes. In the STI version of this function, this bit will be set if block transfer errors are detected in 10 seconds and will not be turned off until the module goes 10 seconds without experiencing another block transfer error.
	3	**RTS timeout** This bit is set to indicate that the N-series module is sampling its inputs faster than the PLC processor can request the data through the block transfer read. This means that data samples are being missed which may cause inaccurate control in the PID function. If this alarm occurs, you should increase your configured RTS time until the alarm clears.
	4	**Invalid BT file configuration** This bit is set if the timer and block transfer control element has been configured to be outside a valid possible range of 0-999.
	6	**Bad structure** This bit is set if there was an error in the block transfer header written to the module.
	7	**Bad module programming block** This bit is set if there was an error in any of the module level programming data written to the module.
	8	**Module fault** This bit is set if any of the programming data sent to the module in the most recent block transfer write was illegal, or if any channel has the bad calibration bit set.

Table C.T
N-series Integer Data Block Continued

Element:	Bit:	Description:
24	11	**I/O reset** This bit is set when the I/O reset line on the backplane is asserted.
	14	**Cold junction temperature underrange** This bit is set if the cold junction temperature on a thermocouple module is below 0°C, and the cold junction alarm enable bit is set.
	15	**Cold junction temperature overrange** This bit is set if the cold junction temperature on a thermocouple module is above 70°C, and the cold junction alarm enable bit is set.
25		**Channel 0 alarms** These bits are set by the N-series logic to indicate a channel 0 alarm condition. The alarm suppression and handshake logic does not effect these bits. Note that the bit layout in this element is also used in N-series data block elements 26-32, 34-41, 43-50, 52-59, and 61-68.
	0	**Channel 0 underrange** This bit is set if channel 0 is an input channel and the input signal is below the range of the module.
	1	**Channel 0 overrange** This bit is set if channel 0 is an input channel and the input signal is exceeds the range of the module.
	4	**Channel 0 low alarm/low clamp** This bit is set if this channel is an input, the actual value is below the low alarm value, and the channel alarm enable bit is set. This bit is also set if this channel is an output, the output value is below the low clamp value, and the channel alarm enable bit is set.
	5	**Channel 0 high alarm/high clamp** This bit is set if this channel is an input, the actual value is above the high alarm value, and the channel alarm enable bit is set. This bit is also set if this channel is an output, the output value is above the high clamp value, and the channel alarm enable bit is set.
	6	**Channel 0 rate alarm** This bit is set if the channel is an input, channel alarm enable bit is set, and the input signal changed at a rate faster than the input rate alarm value. This bit is also set if the channel is an output, the channel alarm enable bit is set, and the output data changed faster than the configured maximum ramp rate.
	8	**Channel 0 bad programming** This bit is set if the any of the channel level programming data is illegal.
	9	**Channel 0 bad calibration** This bit is set if the channel has not had a valid calibration.
	14	**Channel 0 module doesn't match I/O selection** This bit is set if the channel type configuration does not match the actual channel type.

Table C.T
N-series Integer Data Block Continued

Element:	Bit:	Description:
25	15	**Channel 0 invalid source configuration** This bit will be set if the channel is an output and has been configured to receive its value from the output of a PID function, but the channel PID data block file or element number is invalid, or the data block header referenced by the channel PID data block file and element number does not equal 12 indicating a PID block.
26-32		**Channel 1 through channel 7 alarms, respectively** The bit layout in elements 26 through 32 is the same as used in N-series data block element 25.
33-41		**General module and channel alarms result without handshake, with suppression** These bits show the result of an alarm after undergoing suppression logic. The bit layout in element 33 is the same as used in N-series data block element 24. The bit layout in elements 34 through 41 is the same as used in N-series data block element 25.
42-50		**General module and channel alarms result with handshake and suppression** These bits show the result of an alarm after undergoing handshake and suppression logic. The bit layout in element 42 is the same as used in N-series data block element 24. The bit layout in elements 43 through 50 is the same as used in N-series data block element 25.
51-59		**General module and channel alarms suppression** These bits suppress the alarm result bits. The bit layout in element 51 is the same as used in N-series data block element 24. The bit layout in elements 52 through 59 is the same as used in N-series data block element 25.
60-68		**General module and channel alarms handshake** These bits are set by ControlView when it senses an alarm result bit. The bit layout in element 60 is the same as used in N-series data block element 24. The bit layout in elements 61 through 68 is the same as used in N-series data block element 25.
70		**Channel 0 type** This element specifies the ID code for the channel type. Currently supported types and codes are: <u>Type</u> — <u>Code</u> ± 5 volt (4-20 mA) input — 1 Thermocouple input — 5 RTD input — 6 ± 10 volt output — 97 4-20 mA output — 98
71-77		**Channel 1 through channel 7 type, respectively**

Table C.T
N-series Integer Data Block Continued

Element:	Bit:	Description:
79		**Channel data source selector bits** These bits indicate whether each output channel gets its input data from a PID function or from the alternate location. Bits 0-7 correspond to channels 0-7. If the bit is set, it indicates that the corresponding channel gets its data from a PID function. These bits have no effect for channels configured as inputs.
80		**Output 0 PID data block file number** This element contains the configured PID integer data block file number of the PID function whose output will be used as the data source for channel 0 when channel 0 is configured as an output and when the channel 0 data source selector bit is set. Valid values are 125-998.
81		**Output 0 PID data block element number** This element contains the configured PID data block starting element number of the PID function whose output will be used as the data source for channel 0 when channel 0 is configured as an output and when the channel 0 data source selector bit is set. Valid values are 0-920.
82-95		**Output 1 though output 7 PID data block file number and element number**
97		**Input override bits** When these bits are set, the N-series function logic will override the selected input value with the configured override value. Bits 0-7 correspond to input channels 0-7. These bits have no effect on channels configured as outputs.
122-149		**BTR data words** These elements correspond to the BTR file read from the N-series module. Refer to the 1771-N-series User Manual for a complete layout of these data words.
151-209		**BTW data words** These elements correspond to the BTW file sent to the N-series module. The N-series configuration screen on ControlView and N-series function logic write values to these elements. The BTW block address for specific parameters varies depending on the number of outputs in the module. Refer to the Block Transfer Write Parameters section of this document and the 1771-N-series User Manual for a complete layout of these data words. The configuration screen section of this document identifies the BTW address for the various parameters based on the number of outputs in the module.

Table C.U
N-series Floating Point Data Block

Element:	Bit:	Description:
0		**Block header** This element stores a unique number which identifies the data block type. For an N-series function, this number must equal 10.
2		**RTS time calculated in seconds** This element will display the Real Time Sample (RTS) rate in seconds which was configured for the module.
4		**Channel 0 resultant value** For input channels, the resultant value will either display the actual value, or if an input override is enabled, the resultant value will display the override value. For output channels, the resultant value will either display the output value of the appropriate PID function, if the channel data source selector bit is set, or the resultant value will display the channel alternate value, if the channel data source selector bit is cleared.
5-11		**Input 1 resultant value through input 7 resultant value, respectively**
12		**Cold junction temperature resultant value** This element will contain the cold junction temperature resultant value for thermocouple modules.
14		**Channel 0 actual value** For input channels, the actual value is the raw value from the card scaled by the minimum and maximum scaling values and converted to floating point. For output channels, the actual value is the value returned from the card.
15-21		**Input 1 actual value through input 7 actual value, respectively**
22		**Cold junction temperature actual value** This element will contain the cold junction temperature actual value for thermocouple modules.
24		**Input 0 override value** When the input override bit is set, and the channel is configured as an input, the N-series function logic will move this value into the input 0 resultant value.
25-31		**Input 1 override value through input 7 override values, respectively**
32		**Cold junction temperature override value**
34		**Output 0 alternate value** This value will be output by the N-series function if the channel is configured as an output and the channel 0 data source selector bit is off, indicating that the output value is not to be obtained from a PID function. In this case, the user's ladder logic should move the desired output value for channel 0 into this location.
35-41		**Output 1 through output 7 alternate values, respectively**

Table C.U
N-series Floating Point Data Block Continued

Element:	Bit:	Description:
43		**Channel 0 minimum scaling value** This element contains the minimum scaling value, in engineering units, for channel 0, whether the channel is configured as an input or an output. See the N-series input and output scaling function descriptions in this document for an explanation of this value.
44-50		**Channel 1 through channel 7 minimum scaling values, respectively**
51		**Channel 0 maximum scaling value** This element contains the maximum scaling value, in engineering units, for channel 0, whether the channel is configured as an input or an output. See the N-series input and output scaling function descriptions in this document for an explanation of this value.
52-58		**Channel 1 through channel 7 maximum scaling values, respectively**
59-209		**Reserved for internal use, respectively**

N-series Block Transfer Write Parameters

N-series modules differ from other 1771 I/O modules in that the location of data within the block transfer write (BTW) data block varies depending on the number of outputs and inputs in a given module. This section identifies and describes the parameters contained in the BTW block, and provides their addresses in terms of a formula based on the number of outputs in the module being configured.

The block is divided into three sections:

- general parameters
- output channel parameters
- input channel parameters

Not all input channel parameters apply to all types of input channels, and not all output channel parameters apply to all types of output channels.

Parameter addresses are given in terms of the variables BTWstart and Xstart. BTWstart is the starting address of the BTW block within the integer data file (151). Xstart represents the starting address of the section of the BTW data block that contains the values for channel X. For the purpose of these calculations, X ranges from 0-7. Xstart is calculated from the formula:

```
Xstart = (BTWstart) + (number of output channels in
the module) + 3 + (6)(quantity of channels with
channel numbers less than X that are output
channels) + (7)(quantity of channels with channel
numbers less than X that are input channels)
```

For example, an N-series module has 2 outputs and 6 inputs; channels 0 and 1 are outputs and 2 through 7 are inputs. Suppose the integer data block for the module has been configured to start at N140:400.

To calculate Xstart for channel 5:

> In PCO, BTWstart is always the starting element number of the integer data block for this module + 151. This is the starting element number within the N-series integer data block for the block transfer write data to the module. In this case it is 400 + 151 = 551.
>
> There are 2 output channels in the module. There are 2 output channels in the module with channel numbers less than 5 (0 and 1). There are 3 input channels in the module with channel numbers less than 5 (2, 3, and 4).
>
> So, Xstart for channel 5 = 551 + 2 + 3 + (6)(2) + (7)(3) = 589

This means the block transfer write data for channel 5 of this N-series module starts at N40:589. Now you can use the tables to find the locations of specific parameters within this area.

Table C.V
General Parameters

Parameter:	Description:	Address:
Constant	Always 0	BTWstart, bits 0-3
Number of outputs	Number of output channels in the module, 0-8	BTWstart, bits 4-7
Constant	Always 8	BTWstart, bits 8-13
Block transfer write type	Always 2	BTWstart, bits 14-15
Verify	When set, checks BTW data against current programming without changing current programming. Not used by N-series function.	BTWstart + number of outputs +1, bit 0
Temperature scale	0 = Celsius, 1 = Fahrenheit	BTWstart + number of outputs +1, bit 1
BCD select	When set, data values are in BCD. When clear, values are in 2's complement binary. Always 0 for N-series function.	BTWstart + number of outputs +1, bit 2
Constant	Always 0	BTWstart + number of outputs +1, bits 3-14
Cold junction alarm enable	When set, enables CJ overrange and underrange alarms on thermocouple modules	BTWstart + number of outputs +1, bit 15
Real time sample time	Real time sample time in milliseconds, 0 = off. Valid range = 0 and 100 to 10000	BTWstart + number of outputs + 2

Table C.W
Output Channel Parameters

Parameter:	Description:	Address:
Output channel data	Output channel data, valid range is –32768 to + 32767	BTWstart + X + 1
Module low scale value	Use default by setting BTW word to 0	Xstart
Module high scale value	Use default by setting BTW word to 0	Xstart + 1
Module low clamp alarm value Type 97 channel	$\frac{20000}{MaxScale_x - MinScale_x}(LowClamp_x - MinScale_x) - 10000$	Xstart + 2
Module low clamp alarm value Type 98 channel	$\frac{16000}{MaxScale_x - MinScale_x}(LowClamp_x - MinScale_x) + 4000$	Xstart + 2
Module high clamp alarm value	Same as corresponding low clamp alarm equations except substitute HighClamp for LowClamp	Xstart + 3
Module maximum ramp rate limit	Valid values 1 to 200 (%) and 0	Xstart + 4, bits 0-11
Constant	Always 0	Xstart + 4, bit 12
Reset state	0 = last state 1 = minimum output 2 = maximum output 3 = channel reset value	Xstart + 4, bits 13-14
Module alarm enable	When set, module will report high and low clamp and rate alarms. When clear, these alarms are suppressed.	Xstart + 4, bit 15
Module reset value	Same as corresponding low clamp equations except substitute ResetVal for LowClamp. Must equal 0 if reset state is not 3.	Xstart + 5

Table C.X
Input Channel Parameters

Parameter:	Description:	Address:
Module low scale value	For channel type 1, set to +5958 For channel types 5 and 6 set to –29788 This represents the 1 volt or 4 mA point for type 1 channels -300°C (–508°F) point for type 5 channels in temperature mode –100 mV point for type 5 channels in mV mode -200°C (–328°F) point for type 6 channels in temperature mode 1 ohm point for type 6 channels in ohm mode	Xstart
Module high scale value	Set to +29788 This represents the 5 volt or 20 mA point for type 1 channels 1800°C (3272°F) point for type 5 channels in temperature mode 100 mV point for type 5 channels in mV mode 900°C (1652°F) point for type 6 channels in temperature mode 650 ohm point for type 6 channels in ohm mode	Xstart + 1
Module low alarm value Type 1 channel	$\frac{23830}{MaxScale_x - MinScale_x}(LowAlarm_x - MinScale_x) + 5958$	Xstart + 2
Module low alarm value Type 5 channel in Celsius temperature mode	$28.36952381(LowAlarm_x + 300) - 29788$	Xstart + 2
Module low alarm value Type 5 channel in Fahrenheit temperature mode	$15.76084656(LowAlarm_x + 508) - 29788$	Xstart + 2
Module low alarm value Type 5 channel in mV mode	$297.88(LowAlarm_x + 100) - 29788$	Xstart + 2
Module low alarm value Type 6 channel in Celsius temperature mode	$54.16(LowAlarm_x + 200) - 29788$	Xstart + 2
Module low alarm value Type 6 channel in Fahrenheit temperature mode	$30.08888889(LowAlarm_x + 328) - 29788$	Xstart + 2
Module low alarm value Type 6 channel in ohms mode	$91.79661017(LowAlarm_x - 1) - 29788$	Xstart + 2
Module high alarm value	Same as corresponding low alarm equations except substitute HighAlarm for LowAlarm	Xstart + 3
Module rate alarm	Same as corresponding low alarm equations except substitute RateAlarm for LowAlarm, and limit result to 15 bits	Xstart + 3, bits 0-14
Alarm enable bit	When set, module will report high, low, underrange, overrange and rate alarm conditions. When clear, these alarms are suppressed.	Xstart + 3, bit 15
Alarm deadband	Same as corresponding low alarm equations except substitute Deadband for LowAlarm. Value always positive. If result exceeds 255, set = 255; if less than 0, set=0.	Xstart + 4, bits 0-7
Filter time constant	Legal values 0.1 to 9.9 seconds. Download as 1 to 99	Xstart + 4, bits 8-15
10 ohm offset	Legal values –0.99 to +0.99 Download as –99 to +99	Xstart + 5, bits 0-7
RTD type	0 = ohms mode 1 = 100 ohm Pt, European standard 2 = 100 ohm Pt, US standard 3 = 10 ohm copper 4 = 120 ohm nickel	Xstart + 5, bits 8-10
Constant	Always 0	Xstart + 5, bit 11
Thermocouple type	0 = millivolt mode 1 = type B 2 = type E 3 = type J 4 = type K 5 = type R 6 = type S 7 = type T	Xstart + 5, bits 12-15

Appendix D

Glossary

Use this appendix to help you define process control terminology used in this manual.

Actual State

The current state of a device. The state a device is in can be:

- open/on
- closed/off

Alarm Identify

A system command that executes or displays a graphic screen from the Alarm Summary screen.

Alarm Label

The text description of a system tag when it goes into alarm.

BAT

The ControlView Batch Management Option Software (6190-BAT).

Control Variable (CV)

The output from the PID control that is an algorithm or calculated value that controls the loop.

DD2

Two-state device driver: software for controlling devices with two stable states, on/off, open/closed, etc.

DD3

Three-state device driver: software for controlling devices with three stable states, high-speed/low-speed/off, etc.

Device

A combination of elements associated with finite state conditions.

Example: **an automatic block valve complete with solenoid valve, pneumatic actuator, and limit switches**

Device Mode

One of two modes exists for a device:

- Manual
- Supervisory

In Manual mode the operator manually controls the device or valve. In Supervisory mode, PLC processor logic provides the operation signal.

Device Name

The description for a specific device. It usually corresponds to the device name provided on your instrumentation diagrams.

DH+

An Allen-Bradley communications network.

Engineering Units

The type of quantities that are being referenced.

Examples: **gallons, RPM, pounds, volts, inches, minutes**

IFE

1771-IFE, an Allen-Bradley analog input module.

IL

1771-IL, an Allen-Bradley isolated analog input module.

IR

1771-IR, an Allen-Bradley Resistance Temperature Device (RTD) input module.

IXE

1771-IXE, an Allen-Bradley thermocouple input module.

IXHR

1771-IXHR, an Allen-Bradley high resolution thermocouple input module.

Loop

A combination of two or more elements or control functions arranged so that signals pass from one to another for the purpose of measurement and/or control of a process variable.

Loop Mode

The current operating modes of the loop, Supervisory, Cascade/Ratio, Automatic, Manual, Override, or Hand.

Loop Name

The name assigned to the loop by the system programmer.

MOD (RGS)	Module (Rack-Group-Slot). The location of the analog input/output module in the chassis rack, group, and slot number.
N-series	One of a series of Allen-Bradley high resolution analog input and output modules.
OFE	1771-OFE, an Allen-Bradley analog output module.
PanelView	An Allen-Bradley plant floor operator interface terminal.
Parameter Name	The name of a parameter.
Parameter Values	The values assigned to a particular values within the Min/Max limits.
PCO	The ControlView Process Configuration and Operation Option (6190-PCO).
PDS	Allen-Bradley PanelView Development System Software.
PID	Proportional, Integral, Derivative: a regulatory control function (see Loop).
PLC	Programmable Logic Controller.
PLC Number	The PLC Data Highway Plus number assigned to the PLC processor.
Process	The collective functions performed in and by industrial equipment, exclusive of computer and/or control and monitoring equipment.
Process Variable	The variable input from a piece of process equipment that indicates its current value or direction.
Programming Software	Allen-Bradley 6200 Series PLC Programming Software.
PV Tracking	A particular PID configuration that has the setpoint of the loop driven by the PV information.

QRD	1771-QRD, an Allen-Bradley pulse input module.
RTS	Real time sampling. Real-time sampling logic in PCO uses an internal timer on the analog I/O card to synchronize sampling the analog input with execution of a time-based function, such as the PID function.
Scale	The ratio that tells the system how to manipulate data.
Scan Class	The scan rate in seconds that updates the tags in the database for the control system.
Setpoint (SP)	The desired output of a loop. It serves as an input to the PID algorithm for calculating the output to the control variable.
STI	Selectable timed interrupt. A PLC-5 processor function that allows a program file to be executed at precise time intervals.
Tag	A naming convention to reference data points maintained, collected, and manipulated by ControlView. These points will typically reside in the PLC processor.
Tag Address	The system storage location of the tag.
Tag Name	The identifier given to the tag. Examples: TIC1101, WATER_VLV, PUMP_1.
Tag Value	The current interpreted value of the tag point.
Threshold	The variation in the preset alarm setpoint before the alarm activates.

Appendix E

Error Messages

This appendix describes error messages generated by PCO software, their probable cause, and steps required to resolve them. Table E.A lists the tables of error messages by the type of error message displayed.

Table E.A
PCO Error Message Tables

For this type of message:	See:	On page:
DD2	Table E.B	E-2
DD3	Table E.C	E-4
DST	Table E.D	E-6
IFE	Table E.E	E-6
ILX	Table E.F	E-8
IRX	Table E.G	E-10
IXE	Table E.H	E-12
IXH (for IXHR modules)	Table E.I	E-14
NSE	Table E.J	E-16
NSX	Table E.K	E-17
NSY	Table E.L	E-18
OFE	Table E.M	E-18
PID	Table E.N	E-20
QRD	Table E.O	E-22

Important: In the following tables, the error numbers consist of two parts, a module name and a number. The number is not always sequential; gaps between numbers do not mean omissions.

**Table E.B
DD2 Error Messages**

Error number:	Description:	Corrective action:
DD2(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
DD2(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIDD201.PNL. If it is missing, copy it from the installation disk set.
DD2(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
DD2(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.
DD2(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
DD2(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
DD2(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
DD2(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
DD2(19)	**Could not find Block Transfer location(s)...**	Verify that the BT location exists in PLC memory.
DD2(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.

Table E.B
DD2 Error Messages Continued

Error number:	Description:	Corrective action:
DD2(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
DD2(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
DD2(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
DD2(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.
DD2(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.
DD2(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: hello ***<name><password>***
DD2(40)	**Not authorized to call the DD2 configuration screen** The user does not have security access to the DD2 configuration screen.	Log on with the appropriate security or grant the current user access to the BM_DD2_CONFIGURE security code.

Table E.C
DD3 Error Messages

Error number:	Description:	Corrective action:
DD3(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
DD3(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIDD301.PNL. If it is missing, copy it from the installation disk set.
DD3(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
DD3(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.
DD3(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
DD3(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
DD3(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
DD3(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
DD3(19)	**Could not find Block Transfer location(s)...**	Verify that the BT location exists in PLC memory.
DD3(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.

Table E.C
DD3 Error Messages Continued

Error number:	Description:	Corrective action:
DD3(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
DD3(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
DD3(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
DD3(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.
DD3(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.
DD3(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: hello ***<name><password>***
DD3(40)	**Not authorized to call the DD3 configuration screen** The user does not have security access to the DD3 configuration screen.	Log on with the appropriate security or grant the current user access to the BM_DD3_CONFIGURE security code.

Table E.D
DST Error Messages

Error number:	Description:	Corrective action:
DST(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
DST(3)	**No structures found in this group** No structures were found in the ControlView tag database for the type of function you selected.	If a database other than PCO_212 is being used, you must export both databases to merge the template tags provided with PCO into your database. If you are using the PCO_212 database, then the template tags have been deleted or renamed.
DST(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIDST01.PNL. If it is missing, copy it from the installation disk set.
DST(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: hello ***<name><password>***
DST(40)	**Not authorized to call Device Structures screen** The user does not have security access to the Device Structures screen.	Log on with the appropriate security or grant the current user access to the BM_DEVICE_STRUCTURES security code.

Table E.E
IFE Error Messages

Error number:	Description:	Corrective action:
IFE(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
IFE(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIIFE01.PNL. If it is missing, copy it from the installation disk set.
IFE(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
IFE(7)	**Invalid Floating Point file address...** The tag has both a floating point group and an integer group. The file number specified for the floating point data table must be one greater than that for the integer data table, and the starting element number must be the same for both.	Edit the tag to correct the file and element numbers.
IFE(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.

Table E.E
IFE Error Messages Continued

Error number:	Description:	Corrective action:
IFE(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
IFE(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
IFE(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
IFE(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
IFE(19)	**Could not find Block Transfer/Timer location(s)...**	Verify that the BT and Timer locations exist in PLC memory
IFE(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
IFE(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
IFE(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
IFE(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
IFE(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.

Table E.E
IFE Error Messages Continued

Error number:	Description:	Corrective action:
IFE(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.
IFE(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: hello ***<name><password>***
IFE(40)	**Not authorized to call the IFE configuration screen** The user does not have security access to the IFE configuration screen.	Log on with the appropriate security or grant the current user access to the BM_IFE_CONFIGURE security code.

Table E.F
ILX Error Messages

Error number:	Description:	Corrective action:
ILX(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
ILX(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIILX01.PNL. If it is missing, copy it from the installation disk set.
ILX(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
ILX(7)	**Invalid Floating Point file address...** The tag has both a floating point group and an integer group. The file number specified for the floating point data table must be one greater than that for the integer data table, and the starting element number must be the same for both.	Edit the tag to correct the file and element numbers.
ILX(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.

Table E.F
ILX Error Messages Continued

Error number:	Description:	Corrective action:
ILX(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
ILX(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
ILX(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
ILX(19)	**Could not find Block Transfer/Timer location(s)...**	Verify that the BT and Timer locations exist in PLC memory.
ILX(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
ILX(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
ILX(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
ILX(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
ILX(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.
ILX(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.

Table E.F
ILX Error Messages Continued

Error number:	Description:	Corrective action:
ILX(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: hello ***<name><password>***
ILX(40)	**Not authorized to call the IL configuration screen** The user does not have security access to the IL configuration screen.	Log on with the appropriate security or grant the current user access to the BM_IL_CONFIG□RE security code.

Table E.G
IRX Error Messages

Error number:	Description:	Corrective action:
IRX(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
IRX(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIIRX01.PNL. If it is missing, copy it from the installation disk set.
IRX(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
IRX(7)	**Invalid Floating Point file address...** The tag has both a floating point group and an integer group. The file number specified for the floating point data table must be one greater than that for the integer data table, and the starting element number must be the same for both.	Edit the tag to correct the file and element numbers.
IRX(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.
IRX(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
IRX(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
IRX(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.

Table E.G
IRX Error Messages Continued

Error number:	Description:	Corrective action:
IRX(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
IRX(19)	**Could not find Block Transfer/Timer location(s)...**	Verify that the BT and Timer locations exist in PLC memory.
IRX(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
IRX(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
IRX(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
IRX(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
IRX(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.
IRX(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
IRX(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: `hello` *<name><password>*
IRX(40)	**Not authorized to call the IR configuration screen** The user does not have security access to the IR configuration screen.	Log on with the appropriate security or grant the current user access to the BM_IR_CONFIGURE security code.

Table E.H
IXE Error Messages

Error number:	Description:	Corrective action:
IXE(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
IXE(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIIXE01.PNL. If it is missing, copy it from the installation disk set.
IXE(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
IXE(7)	**Invalid Floating Point file address...** The tag has both a floating point group and an integer group. The file number specified for the floating point data table must be one greater than that for the integer data table, and the starting element number must be the same for both.	Edit the tag to correct the file and element numbers.
IXE(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.
IXE(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
IXE(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
IXE(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
IXE(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.

Table E.H
IXE Error Messages Continued

Error number:	Description:	Corrective action:
IXE(19)	**Could not find Block Transfer/Timer location(s)...** Please verify that the BT and Timer locations exist in PLC memory.	
IXE(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
IXE(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
IXE(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
IXE(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
IXE(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.
IXE(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.
IXE(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: `hello` *<name><password>*
IXE(40)	**Not authorized to call the IXE configuration screen** The user does not have security access to the IXE configuration screen.	Log on with the appropriate security or grant the current user access to the BM_IXE_CONFIGURE security code.

Table E.I
IXH Error Messages

Error number:	Description:	Corrective action:
IXH(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
IXH(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIIXH01.PNL. If it is missing, copy it from the installation disk set.
IXH(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
IXH(7)	**Invalid Floating Point file address...** The tag has both a floating point group and an integer group. The file number specified for the floating point data table must be one greater than that for the integer data table, and the starting element number must be the same for both.	Edit the tag to correct the file and element numbers.
IXH(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.
IXH(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
IXH(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
IXH(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
IXH(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.

Table E.I
IXH Error Messages Continued

Error number:	Description:	Corrective action:
IXH(19)	**Could not find Block Transfer/Timer location(s)...**	Verify that the BT and Timer locations exist in PLC memory.
IXH(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
IXH(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
IXH(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
IXH(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
IXH(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.
IXH(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.
IXH(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: `hello` *<name><password>*
IXH(40)	**Not authorized to call the IXHR configuration screen** The user does not have security access to the IXHR configuration screen.	Log on with the appropriate security or grant the current user access to the BM_IXH_CONFIGURE security code.

Table E.J
NSE Error Messages

Error number:	Description:	Corrective action:
NSE(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
NSE(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OINSE01.PNL, OINSE02.PNL, OINSE03.PNL, OINSE04.PNL, OINSE05.PNL, and OINSE06.PNL. If any file is missing, copy it from the installation disk set.
NSE(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
NSE(7)	**Invalid Floating Point file address...** The tag has both a floating point group and an integer group. The file number specified for the floating point data table must be one greater than that for the integer data table, and the starting element number must be the same for both.	Edit the tag to correct the file and element numbers.
NSE(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.
NSE(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
NSE(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
NSE(22)	**Configuration Error for Channel '%p1'** Download was not accomplished because one or more of the fields on the pop-up for this channel was not correctly configured.	Return to this pop-up and configure the channel correctly before proceeding to download.
NSE(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
NSE(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
NSE(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.

Table E.J
NSE Error Messages Continued

Error number:	Description:	Corrective action:
NSE(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.
NSE(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.
NSE(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: `hello` *<name><password>*
NSE(40)	**Not authorized to call the N-series configuration screen** The user does not have security access to the N-series configuration screen.	Log on with the appropriate security or grant the current user access to the BM_NSE_CONFIGURE security code.

Table E.K
NSX Error Messages

Error number:	Description:	Corrective action:
NSX(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
NSX(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
NSX(19)	**Could not find Block Transfer/Timer location(s)...**	Verify that the BT and Timer locations exist in PLC memory.
NSX(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.

Table E.L
NSY Error Messages

Error number:	Description:	Corrective action:
NSY(15)	**Uploading from PLC...** This message indicates that configuration information is being read from the PLC processor.	This is an information message only, and generally requires no action.
NSY(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
NSY(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
NSY(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.

Table E.M
OFE Error Messages

Error number:	Description:	Corrective action:
OFE(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
OFE(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIOFE01.PNL. If it is missing, copy it from the installation disk set.
OFE(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
OFE(7)	**Invalid Floating Point file address...** The tag has both a floating point group and an integer group. The file number specified for the floating point data table must be one greater than that for the integer data table, and the starting element number must be the same for both.	Edit the tag to correct the file and element numbers.
OFE(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.

Table E.M
OFE Error Messages Continued

Error number:	Description:	Corrective action:
OFE(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
OFE(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
OFE(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
OFE(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
OFE(19)	**Could not find Block Transfer/Timer location(s)...**	Verify that the BT and Timer locations exist in PLC memory.
OFE(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
OFE(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
OFE(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
OFE(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
OFE(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.

Table E.M
OFE Error Messages Continued

Error number:	Description:	Corrective action:
OFE(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.
OFE(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: `hello` *<name><password>*
OFE(40)	**Not authorized to call the OFE configuration screen** The user does not have security access to the OFE configuration screen.	Log on with the appropriate security or grant the current user access to the BM_OFE_CONFIGURE security code.

Table E.N
PID Error Messages

Error number:	Description:	Corrective action:
PID(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
PID(2)	**Invalid Floating Point file address...** The tag has both a floating point group and an integer group. The file number specified for the floating point data table must be one greater than that for the integer data table, and the starting element number must be the same for both.	Edit the tag to correct the file and element numbers.
PID(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIPID01.PNL and OIPID02.PNL. If either is missing, copy it from the installation disk set.
PID(7)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
PID(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.
PID(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
PID(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.

Table E.N
PID Error Messages Continued

Error number:	Description:	Corrective action:
PID(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
PID(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
PID(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
PID(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
PID(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
PID(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
PID(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.
PID(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.
PID(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: `hello` *<name><password>*
PID(40)	**Not authorized to call the PID configuration screen** The user does not have security access to the PID configuration screen.	Log on with the appropriate security or grant the current user access to the BM_PID_CONFIGURE security code.

Table E.O
QRD Error Messages

Error number:	Description:	Corrective action:
QRD(1)	**Database not loaded** A ControlView database must be loaded prior to operation.	Load a ControlView database.
QRD(4)	**Cannot open a channel to screen window** This message is displayed only if a screen file has been deleted or corrupted.	Check the \access\frm directory for the presence of OIQRD01.PNL. If it is missing, copy it from the installation disk set.
QRD(5)	**Invalid Structure Name** This message indicates an internal problem with the tag database, and should not normally be seen.	The database may be corrupted and may need to be restored from a backup.
QRD(7)	**Invalid Floating Point file address...** The tag has both a floating point group and an integer group. The file number specified for the floating point data table must be one greater than that for the integer data table, and the starting element number must be the same for both.	Edit the tag to correct the file and element numbers.
QRD(8)	**Configuration file cannot be found for this group** This message indicates that this group has not been previously saved to a file.	This is an information message only, and generally requires no action.
QRD(9)	**Structure cannot be found in configuration file** This message indicates that a configuration file exists for this function, but that the selected structure has not been previously saved to it.	This is an information message only, and generally requires no action.
QRD(14)	**No node configured for structured tag!** The selected tag does not have a valid node name specified.	Edit the tag and specify a valid ControlView node name.
QRD(17)	**Could not open a device for Data Highway communications...** The device configured for Data Highway communications cannot be accessed.	Make certain the ControlView configuration is correct and the configured Data Highway communications device is present in the computer and functioning correctly.
QRD(18)	**Error in PLC transmissions...** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.

Table E.O
QRD Error Messages Continued

Error number:	Description:	Corrective action:
QRD(19)	**Could not find Block Transfer/Timer location(s)...**	Verify that the BT and Timer locations exist in PLC memory.
QRD(20)	**Error in attempt to transmit data to/from PLC** There was a problem communicating with the PLC processor.	Verify that the Data Highway is properly connected, ControlView Data Highway configuration is correct, the structured tag is configured for a valid PLC address, the PLC address exists, and the PLC file size is large enough to accommodate the data block being transmitted.
QRD(26)	**Invalid directory specification** The directory name you specified is invalid. It may have illegal characters, or incorrect syntax.	Enter a valid DOS directory name.
QRD(27)	**Disk drive error detected...** There was a problem reading or writing to the disk.	There may not be enough free space on the disk. For floppy diskettes, the drive door may be open, or the diskette may be write protected.
QRD(29)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists.
QRD(30)	**The configured PCO directory does not exist and could not be created.** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive.
QRD(31)	**Could not create PCO CONFIGURATION DIRECTORY** There was a problem creating the specified directory. Usually this occurs when you try to create more than one level of subdirectory at a time.	Exit to DOS or use the application window to create the directory, or specify a directory that already exists on your hard drive, before attempting to save any PCO files.
QRD(39)	**Must log on to system for access** No user is logged on.	Log on with a valid account name. At the command line enter: `hello` *<name><password>*
QRD(40)	**Not authorized to call the QRD configuration screen** The user does not have security access to the QRD configuration screen.	Log on with the appropriate security or grant the current user access to the BM_QRD_CONFIGURE security code.

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